

The

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The Use of the Pulse-Ratio Test for Rating Physical Efficiency

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THE increase in demand for graduate theses in the Physiology of Exercise, by students in physical education, has stimulated rather extensive research in a number of fields. Out of the various investigations carried on in this laboratory, a technique has been developed for rating physical efficiency by means of a pulse-ratio test. The technique is of such a type that the test not only applies to problems which are general in nature but also to the more specialized sports. Since numerous papers are appearing from time to time involving similar technique, it seems more economical to present a rather detailed discussion of the pulse-ratio technique in one paper, rather than to treat it more or less inadequately in several publications.

The original idea for the pulse-ratio test as it is now being used in this laboratory, came from the work of Hambly¹ and Hunt.² Dr. J. T. McClintock³ has made use of Hambly's technique for rating physical efficiency in his laboratory for a number of years. When the problem of physical efficiency was suggested as a project in the Physiology of Exercise, Dr. McClintock suggested to the writer that he develop a pulse-ratio test which could be applied to such problems.

The commonly accepted idea concerning the response of the heart to exercise, reenforced by rather extensive research on various phases of the problem, is that cardio-vascular response reflects the physiological condition of the individual. This idea suggests the possibility of adopting some measure of cardio-vascular response as a means of rating physical efficiency. If a test of such a nature is to be employed, the validity of the test is the first consideration. No doubt one might approach this problem from many angles. We have been interested in adopting some method which eliminated complicated apparatus and procedures. The simplicity of the pulse-ratio technique, together with its flexibility, prompted a rather extensive investigation of its possibilities. The paramount idea in mind is the

¹ Hambly, W. D., M. S. Pembrey and E. C. Warner. The Physical Fitness of Men Assessed by Various Methods. 1925, Guy's Hosp. Rep., 75: 388-394.

² Hambly, W. D., G. H. Hunt, L. E. L. Parker, M. S. Pembrey and E. C. Warner. Tests for Physical Efficiency, Part 2, 1922, Guy's Hosp. Rep., 72: 367-385.

³ Hunt, G. H. and M. S. Pembrey. Tests of Physical Efficiency, Part 1, 1921, Guy's Hosp. Rep., 71: 415-428.

⁴ McClintock, J. T., 1931. Private Communications.

development of some test for rating physical efficiency which is practical for use by coaches, and one which they can handle with a high degree of accuracy.

In this laboratory our primary interest is the application of the pulse-ratio test to problems in physical education. It need not, however, be confined to this field. The test, as described, may be applied to any individual or group of individuals where a comparative rating of physical efficiency is desired.

The Pulse-Ratio Defined

The pulse-ratio, as we use it, represents the ratio of the resting pulse rate to the rate after exercise. This ratio is found by dividing the total pulse for two minutes after a known amount of exercise by the normal resting pulse for one minute. Suppose the normal resting pulse for one minute is 70 and the total pulse for two minutes after a prescribed exercise is 210. Then the pulse-ratio is represented by $210/70$ or 3.0.

The Technique Employed in Rating Physical Efficiency by Means of the Pulse-Ratio Test

The technique employed in rating physical efficiency by means of the pulse-ratio test is, on the face of it, quite simple. Our experience has taught us, however, that there are many pitfalls, and chances for variation, which are sufficient to destroy the usefulness of the test.

The Standard Work Employed. If one is to use the heart response to exercise for comparing the reaction of different individuals, or the same individual under different conditions, a standard exercise, applicable to all, must be adopted. In selecting standard exercise some type must be chosen that requires practically no skill and that is available almost anywhere. Hambly and his co-workers investigated various types of exercise such as walking, stair-climbing and running. His investigations, together with our own, have led to the adoption of stool climbing. The stool commonly used is 13 inches high, and of such dimensions that it may be mounted and dismounted satisfactorily. This exercise can be performed by any normal individual without experience and without being conscious of any undue stress or strain. A detailed drawing of the stool is shown in Figure 1. This type of standard work is not only convenient but it is extremely flexible. It is possible to vary the amount of work performed to suit the experiment under consideration. This is done either by varying the rate of stepping or by increasing the number of steps at a uniform rate. One may use 15, 20, 25, 30, 35, 40, 45 steps per minute. Here we might add that the upper limit is about 60, due to the inability of the majority of people to mount and dismount at a faster rate. On the other hand, one may vary the amount of exercise by

using, say 20 steps per minute for 1, 2, or 3 minutes as indicated by the experiment.

The act of mounting and dismounting is carried out in a regular cadence, determined by counting 1, 2, 3, and 4. The subject is seated in such proximity to the stool that when he rises he is in a position to begin the work. At the count of 1, the left foot is placed on the stool; at the count of 2, the right foot is placed on top of the stool. Now the subject is in an upright position on top of the stool. At the count of 3, the left foot is placed on the floor, and at the count of 4, the right foot is placed on the floor. Now the subject is standing in front of the stool as in the beginning. The act having been completed, the subject is ready for a second trial.

The cadence used is acquired by the experimenter either by a stop watch or a metronome. By practice an experimenter soon acquires the proper rate of counting for whatever rate he desires to use. By calibrating a metronome, the technique is enhanced and guides the experimenter in his counting rhythm.

In this laboratory a calibrated metronome has been adopted (Type F782, Central Scientific Co., Chicago, Ill.,) This particular metronome was adopted because it is equipped with a signal bell which is set to ring every fourth beat. The apparatus has been calibrated so that various amounts of exercise are indicated on the scale. For the convenience of those who might wish to use this metronome the calibrations are given. In each case the top of the pendulum weight is set at the metronome scale as indicated.

| Exercise per Minute | Metronome Scale |
|---------------------|-----------------|
| 12 steps | 40 |
| 18 steps | 66 |
| 20 steps | 76 |
| 25 steps | 96 |
| 30 steps | 120 |
| 35 steps | 138 |
| 40 steps | 160 |

Suppose the initial exercise adopted is 18 steps per minute. The top of the pendulum weight is set at 66 on the metronome scale. The subject is instructed as follows; Listen to the metronome. Get the rhythm in mind. Listen for the signal bell. At the first beat after the signal, place the left foot on the stool. (The start may be made with either the right or left foot according to the handedness of the subject.) On the second beat, place the right foot on the stool. Now the subject is in an upright position on the stool. On the third beat the left foot is placed on the floor and on the fourth beat, as the bell rings, the right foot is placed on the floor. Now the subject is standing in front of the stool, ready to repeat the exercise. The experimenter need pay no attention to the cadence of the stepping but he must count the number of completed trials which are indicated by the ringing of the bell. If 18 steps is the exercise performed, at the count of 18, the subject stops, seats himself in the chair. The pulse is immediately counted.

Since standard work is the object of the stool climbing, there are several points to be observed in order to preserve uniformity. In

each trial the subject must assume a uniform position on top of the stool. In addition, uniformity in the position and action of the arms must be adopted. In this laboratory, the elbows are kept in contact with the body, the forearm held stationary at right angles to the body. This position is assumed because it seems more natural, and a stationary member is more easily controlled than one which is swinging.

It is advisable to give each subject a few practice trials before the test is given. This serves a dual purpose in that it acquaints him with the exercise he is to perform as well as making him more stable physiologically.

The Standard of Comparison. If we are to compare the efficiency ratings of different individuals or those of the same individual under different conditions, some standard of comparison must be set up. This is done by adopting a standard pulse-ratio that remains constant, and allowing the amount of standard exercise required to produce it to be the variable factor. The standard pulse-ratio adopted in this laboratory is 2.5. This is an empirical value. It has been adopted because experience has shown that this ratio may be obtained by the majority of individuals by moderate amounts of exercise. This value is found, as previously stated, by dividing the total pulse for two minutes after a known amount of exercise by the normal resting pulse for one minute. Since the 2.5 pulse-ratio is empirical, if occasion demanded, some other value, such as 2.3 or 2.4, might be substituted without detracting from the value of the test.

The Method for Determining the Amount of Work Required to Produce a Pulse-Ratio of 2.5. The next question to be considered is, how is the amount of work required to produce a pulse-ratio of 2.5 determined? In the first place, this value is determined as "number of steps per minute." The basis of rating one's efficiency is, then, the number of steps required to produce this 2.5 pulse-ratio. This value is determined by mathematical formula derived from a graphic calculation where we have given one value distinctly below and one distinctly above the 2.5 ratio. The lower value must be more than 2.0 since merely doubling the normal pulse rate gives this value. The details are as follows: An amount of work is selected, usually 18 steps for one minute, which gives a pulse-ratio below 2.5. Then a second rate is employed, usually 30 or 40 steps for one minute, which gives a value above 2.5. These data permit the establishment of two points on the graph. The first one is found by plotting the known number of steps on the abscissa and the resulting pulse-ratio on the ordinate. The second point is determined in the same manner. The next step in the procedure is to connect these two points by a straight line. Now, by dropping an ordinate from the place where the line connecting the two values just determined crosses the 2.5

abscissa, to the base-line representing the number of steps, the mathematical value in number of steps is indicated. Figure 2 illustrates the method.

It is seen that the pulse-ratios are plotted on the ordinate to the scale of .1 pulse-ratio equals one centimeter.⁵ This makes possible the plotting of the pulse-ratio values in hundredth places which are represented by millimeters. The amount of exercise is plotted on the abscissa to the scale of 1 cm. equals five steps. In the illustration presented, fifteen steps produced a pulse-ratio of 2.24. Thirty steps gave a pulse-ratio of 2.80. The line connecting these two points crosses the 2.5 abscissa at a point where, if an ordinate is dropped to the base-line, 22 steps are mathematically required to produce a pulse-ratio of 2.5. Twenty-two steps, then, is the figure adopted for comparing the subject with either himself under different conditions or with other individuals.

The first rate of exercise, 15 or 18 steps for one minute, presents no difficulty, since almost any light exercise will produce in most subjects a pulse-ratio of more than 2.0 and less than 2.5. In case of the higher ratio, one may experience some difficulty. If it should happen that 30 steps is not strenuous enough to give a value above 2.5, this obstacle is easily overcome by increasing the rate of stepping to, say, 40 steps per minute. Our experience has shown that 40 steps is usually adequate.

The Determination of the Pulse Rate. The determination of the pulse rate, although quite a simple technique, presents sufficient difficulties to destroy the validity of the pulse-ratio test if certain precautions are not observed. The main consideration is uniformity. It is more or less immaterial whether normal sitting or standing pulse is used. In this laboratory both positions have been employed. We believe, however, that sitting pulse is preferable to standing pulse. One finds that the normal standing pulse tends to increase somewhat due to the effort required in standing.

The auscultatory method is the most reliable for determining the pulse rate. Time is best checked by a stop watch. The pulse is considered as normal when in 3 full one-minute counts, with one minute elapsing between each count, the same figures are obtained. A variation in a beat or two may be disregarded, and charged to experimental error. In all cases, the full time must be counted. For the normal rate this is one minute and after exercise two minutes. Experience and good judgment are the important factors in determining pulse rate.

The reading of the pulse for two minutes after exercise should begin at the instant the subject places both feet on the floor following the last trial of his exercise. The beginning of the count is impor-

⁵ In Fig.'s 2 and 3 the scale is two cms. instead of one since there are only five divisions per cm.

tant since compensation begins very soon after exercise and a delay in starting the count leads to serious error.

Consideration must be given to the length of time elapsing between the first exercise and the second. Since the first exercise is very mild, not more than 5 minutes need elapse. In the absence of fatigue, the criterion to be followed in determining this interval is the pulse rate. When the heart has returned to normal, the second exercise may be done. If it is necessary to repeat the more strenuous exercise, 10-15 minutes rest may be necessary. The criterion is again the pulse rate.

If, in any case, repetition of the test is of sufficient severity to induce fatigue, there is another complication. Successive trials of so mild an exercise as 15 steps for one minute cause a progressive increase in the resulting pulse-ratios. For example, in an experiment where we gave five successive tests to the same individual with not more than ten minutes rest between trials, although the heart rate appeared normal, there was a progressive increase in the resulting pulse-ratios as follows:

| | |
|--|------|
| For test 1, 15 steps gave a pulse-ratio of | 2.20 |
| 2 | 2.30 |
| 3 | 2.40 |
| 4 | 2.45 |
| 5 | 2.50 |

Another condition which must be avoided is the application of the test too soon after the individuals have participated in strenuous exercise, such as 40 minutes of basketball. In these cases the slightest amount of exercise causes an abnormal cardiac response, the rate being far in excess of the results obtained before strenuous exercise. These findings are in accord with the generally accepted idea that fatigue increases the irritability of the cardio-vascular system.

Method for Determining Efficiency Ratings. For the purpose of comparing data, the number of steps required to produce a 2.5 pulse-ratio is converted into per cent efficiency. Various methods have been employed for doing this. In some instances, the individual in a group under investigation who required the greatest number of steps to produce a 2.5 pulse ratio has been assumed to be one hundred per cent efficient. In other cases some arbitrary number of steps, for example 80, has been assumed as representing one hundred per cent efficiency. As a matter of convenience we let 50 steps for one minute represent the amount of exercise required to produce a pulse-ratio of 2.5 in a highly efficient individual. For sake of calculation the value 100 is assigned to this individual. Fifty steps for one minute is adopted since this number falls above the requirements for a 2.5 pulse-ratio of the fittest individual which we examined, while at the same time this figure is not far above the requirements of our best

athletes. Now, by substituting the amount of exercise, expressed in number of steps, required to produce a 2.5 pulse-ratio in the formula

$$\text{Efficiency Rating} = \frac{100 (\text{No. steps required for 2.5 pulse-ratio})}{50}$$

the data are reduced to an arbitrary per cent basis.

In order that the data may be conveniently classified and recorded, a record sheet is prepared.

RECORD SHEET

Physical Efficiency as Rated by the Pulse-Ratio Test

Name, John Jones Date 1-5-31

Age 22 Height 5'11" Weight 165

Physical Condition In athletic training.

I. Normal Sitting Pulse-Rate

1. 35

2. 35

Total 70

II. Heart Rate After 15 Steps of Exercise

1. 45

2. 40

3. 36

4. 36

Total 157

Ratio 2.24

III. Heart Rate After 30 Steps of Exercise

1. 70

2. 50

3. 40

4. 36

Total 196

Ratio 2.80

IV. Steps Required to Produce 2.5 Pulse-Ratio, 22*

Per Cent Efficiency Rating $\frac{22 \times 100}{50} = 44.0\%$

* The method for determining the number of steps required to produce a 2.5 pulse-ratio in this case is shown in Fig. 2.

The Record Sheet. A sample record sheet is presented on this page. It provided space for a subject's history as well as for recording the pulse-rates, pulse-ratios, determined exercise and per cent efficiency ratings. The heart rate is recorded in one-half minute intervals. This is convenient for giving a clue to the time of the return to normal.

The Validity of the Theoretical Values Determined by the Graphic Method. A crucial point in this test is the validity of the mathematical number of steps, as determined by the graphic method, to produce a 2.5 pulse-ratio. If these values thus determined are not valid, then the whole scheme is useless. This phase of the procedure has been thoroughly investigated, sufficient data having been collected to justify conclusions. A detailed discussion of the experimental check as it has been carried out will be omitted from this discussion, but will be presented in a separate paper.* An investigation of nearly a hundred cases shows that the values determined by the graphic method are valid. In fact, the predicted values have been found to be as accurate as those experimentally determined.

* Tuttle, W. W. and Geo. Wells, "The Validity of the Graphic Method for Determining the Amount of Work Required to Produce a Given Pulse-Ratio," 1931, Unpublished Report.

The Application of the Pulse-Ratio Test to the More Specialized Sports

The flexibility of the pulse-ratio test seemed to warrant an attempt to apply it to some of the more specialized sports. The experiments which have been carried out have proven quite successful in the opinion of the coaches in their special fields of endeavor.

Since the basis of this test is controlled exercise, then any sport which involves definite rhythmic movements may be investigated. Such a condition exists in the case of sports involving gymnasium apparatus and swimming.

*The Application of the Pulse-Ratio Test to Performance on the Horizontal Bar.*⁷ Performance on the horizontal bar involves exercises such as chinning, hanging and flexing thighs to a right angle to body, etc. The only difference involved in making general and specific use of the pulse-ratio test is the type of standard exercise employed. For general application the standard exercise is mounting a stool, while for the horizontal bar the specific movement being investigated is substituted for the stool mounting. This is feasible because the definite movements involved make them as suitable for standard controlled exercise as mounting a stool. Instead of varying the rate of performance per minute, the rate is kept constant and the number of trials varied. The remaining procedure is exactly the same. For example, in case of chinning, two trials gave a pulse-ratio of 2.4 while eight trials gave a ratio of 2.7. The graphic method of determination indicates that in order to produce a pulse ratio of 2.5 the subject must perform four trials. (Figure 3.) Now by comparing the number of trials of a given exercise necessary to produce a 2.5 ratio, athletes participating in the sport may be compared as to their efficiency in the sport.

That the pulse-ratio test points out differences in one's ability to perform on the horizontal bar is shown by a brief discussion of our findings. When the accomplishments of an athlete who was recognized as an expert on this piece of apparatus and who was in training was compared with the mean accomplishments of 30 men picked at random it was quite clear that the trained athlete was far superior to the untrained. There were some in the group who were specialists in some of the exercises. Where this was true the data show them as such. The only criterion available for checking the data is the fact that a number of the men were members of competitive teams, while others were beginners. The data paralleled these facts.

*The Application of the Pulse-Ratio Test to Exercise on the Parallel Bars.*⁸ An experiment similar to the one just described, involving

⁷ Tuttle, W. W. and R. C. Wilkins. "The Application of the Pulse-Ratio Test to Efficiency in Performing on Gymnasium Apparatus, The Horizontal Bar," 1930 *Arbeitsphysiol.*, 3: 449-455.

⁸ Schroeder, E. G. and W. W. Tuttle, "The Application of the Pulse-Ratio Test to Efficiency in Performing on Gymnasium Apparatus. The Parallel Bars," 1931, Unpublished Report.

the parallel bars, has been completed. Here again the only variation in the procedure is the substitution of exercises on the parallel bars for the stool climbing. The results show that, as in the case of the horizontal bar, the trained subject is far superior to the untrained. To be more specific, an expert on the parallel bars required eight trials of jumping to cross rest and dismounting, untrained subjects required as few as one trial, the mean of 30 subjects picked at random being four.

In sports where skill of a specialized kind is required, efficiency takes on a two-fold aspect, viz., skill and physical fitness. A subject who is truly physically fit, yet untrained in a highly specialized sport, will naturally fall among the inefficient by the pulse-ratio criterion. On the other hand, one who is skillful, yet in poor physical condition, will likewise be classified as inefficient.

The Application of the Pulse-Ratio Test to Efficiency in Swimming. The flexibility of the pulse-ratio test makes it applicable for measuring efficiency in swimming. It is necessary, however, to confine the test to trained swimmers. Each recognized stroke in swimming involves very definite, smooth and coordinated movements. It seems reasonable to suppose, then, that ability in swimming technique materially affects one's swimming efficiency. Here again both physical fitness and swimming technique are determining factors. Armbruster⁹ is carrying on a study of the efficiency of his varsity swimming squad. He varied the pulse-ratio technique by substituting swimming strokes for stool climbing. Although the study is yet incomplete, the data show that practice and training materially affect the efficiency of the swimmers.

The Use of the Pulse Ratio Test for Separating Technique Efficiency and Physical Efficiency. The data obtained on this phase of the work are too meager for generalization. However, the possibility of separating physical and technical efficiency is not a remote one. The approach to this problem is a comparison of the efficiency, where exercise requiring no skill (stool climbing) is used as the basis, with efficiency where exercises requiring skill are employed. That there is a difference is easily demonstrated. It is also easy to show that by giving attention to either variable, that is physical condition or training technique, the difference between physical efficiency and technical efficiency may be decreased.¹⁰

Evidence that the Pulse-Ratio Test Points Out Differences in Physical Efficiency

The basis of the pulse-ratio test is the cardiac response to exercise. Past researches have shown conclusively that there is a wide individ-

⁹ Armbruster, David and W. W. Tuttle. "The Use of the Pulse-Ratio Test for Rating Efficiency in Swimming," 1931, Unpublished Report.

¹⁰ Schroeder, E. G. "The Use of the Pulse-Ratio Test in Separating Physical Efficiency and Technique Efficiency." 1931, Unpublished Report.

ual variation in cardiac response to exercise as well as a wide variation in the same individual at different times and under different conditions. That physiological changes are reflected by a change in heart rate is easily demonstrated. Such factors as the emotions, fatigue, loss of sleep and many other conditions change the heart rate. There is evidence that this change in heart rate as well as the rate of return to a normal level after exercise is an individual thing. Also it has been proven that the rate of return to normal may be altered. Such conditions as physical training, meals, fatigue and loss of sleep have been shown to alter this process. It is, in fact, not a difficult task to understand why the heart responds to slight physiological changes when the controlling mechanism involved is considered. The vagal-sympathetic balance is easily disturbed as is the case with the calcium-potassium balance in the blood. In reality, there are at least eight possibilities for changing the rate of the heart beat. Familiarity of workers in this field with the compensatory mechanism of the heart justifies omission of a detailed discussion of it here.

The crucial test of the pulse-ratio technique is whether it shows the physiological changes which are reflected by the compensatory mechanism of the heart. Furthermore, if the pulse-ratio test does detect such differences we must determine whether there exists a definite relationship between the findings made by the test and the conditions which exist. In order to throw some light on this phase of the work, citation is made, briefly, to instances where this point has been investigated.

The investigations of Hambly and Hunt led them to believe that the pulse-ratio test was adequate in pointing out variations in physiological condition. In this laboratory, experiments have been carried out with high school boys," college men" and college women." Such questions as the effect of fatigue, smoking, athletic training, physical condition, etc. have been investigated. This particular group of experiments was selected because the concensus of opinion is that such factors alter the cardiac response to exercise and are important as problems in physical education.

The evidence which we have gathered supports the thesis that the pulse-ratio test detects condition as reflected by the cardiovascular system. Attention is called at this time to some of our findings. In the experiment on the effect of smoking on the physical efficiency rating, the data show that for a group of 15 high school boys, their mean efficiency rating is 5 per cent less than the mean of those who abstain from this practice. Furthermore, the data indicate

¹¹ Tuttle, W. W. and J. S. Skien, "The Efficiency Rating of High School Boys as Shown by the Pulse-Ratio Test." 1930, *Research Qr.* 1:3:19-33.

¹² Wells, Geo. A. "Study of the Physical Efficiency of High School and College Athletes by Means of the Pulse-Ratio Test." 1929, Unpublished Report.

¹³ Tuttle, W. W. and Henryetta Frey, "A Study of the Physical Efficiency of College Women as Shown by the Pulse-Ratio Test." 1930, *Research Qr.*, 1:4:17-25.

that there are 95 chances in 100 that non-smokers are at a distinct advantage from the standpoint of physical efficiency. True, the group studied is small, but certainly the results parallel the generally accepted view in regard to smoking. In order to substantiate these results, the physical efficiency of a group of 10 university women, who are habitual smokers, was determined by the pulse-ratio test. They were found to be 13 per cent less efficient than the women who do not smoke. Abstinence from smoking is always stressed by athletic coaches. This "training rule" is no doubt one of tradition, based upon opinion of performance principally, but the pulse-ratio test substantiates this view. In fact, the test, if there is any virtue in it, shows conclusively that smoking is a detriment to athletes.

The extent to which women should indulge in athletics has always been a debatable question. The effect of athletic participation on women has been studied by use of the pulse-ratio test. It is interesting to note that when the physical efficiency of a group of 80 women participating in athletics is compared with 90 who indulge in no athletic training, the athletic group have a mean efficiency rating 6 per cent higher than the non-athletic group. Furthermore, the data indicate there are 95 chances in 100 that women participating in athletics will have a higher efficiency rating than those who ignore physical training. Here again, the tendencies indicated by the pulse-ratio test are in accord with the views generally expressed by authorities on this subject.

No one is willing to argue that fatigue is conducive to efficiency. The tendency pointed out by the pulse-ratio test is interesting. First, the problem of fatigue was considered from the standpoint of daily routine. Under these conditions a group of 10 women were found to be 6 per cent less efficient at 10:00 P.M. than they were at 8:00 A.M. This seems logical. The question of fatigue was also investigated from the laboratory standpoint, where the conditions were under our control. The data show that fatigue induced by 250 deep knee-bends decreases the efficiency rating 22 per cent. These results not only corroborate the diurnal findings, but are in accord with the general belief in regard to fatigue.

There is yet another finding that is of special interest. While following the efficiency of his football team by the pulse-ratio test, a coach recently directed our attention to an outstanding case. J. V., after one week of training, had an efficiency rating of 70 per cent. Very soon he received an injury which prevented him from training for a week or more. When he finally reported for practice his efficiency rating was 60 per cent. After two weeks of strenuous practice J. V.'s efficiency rating was 96 per cent. Ten days later the old injury was hurt, necessitating the abstinence from training for more than a week. Upon returning to the team the efficiency rating was

44 per cent. The only available check on these data is the experience and observation of the coach. In his opinion, the results of the pulse-ratio test were authentic, in fact, so much so that he was willing to substitute it for his own judgment.

Many other experiments have been carried out with a similar trend, but a further discussion would add nothing to the evidence which we wish to present. The idea in mind in carrying out these investigations was to test the pulse-ratio test, and to establish its validity. The results of the investigations make it evident that the pulse-ratio test possesses much virtue. The data are somewhat meager for generalization, but the tendency is in favor of the success of the pulse-ratio test for detecting the physiological changes reflected by the cardio-vascular mechanism.

The use of the pulse-ratio test in this laboratory up to the present time has been limited to normal cases. However, a number of individuals with cardio-vascular disturbances have been encountered. Although in our investigation they were eliminated, they deserve special comment.

Such cases were detected by the method employed for proving the validity of the graphic method as a means of determining the number of steps required for a 2.5 pulse-ratio. A number of cases were encountered which could not be checked by our method, that is, when the calculated number of steps required for a 2.5 ratio was performed, the resulting pulse-ratio was not 2.5.

Furthermore, it should be said that these cases were not detected by the routine physical examination to which they had been subject. Just how valuable the pulse-ratio test is in detecting cardio-vascular disturbances has not yet been determined.

Summary

The technique employed in rating physical efficiency by means of the pulse-ratio test is described in detail. Evidence is submitted which supports the validity of the use of the test as a means of pointing out differences in physical efficiency.

Methods are described for applying the pulse-ratio test to highly specialized sports such as gymnastics and swimming. It is also suggested that where both physical efficiency and efficiency in technique are involved, these two phenomena may be tested separately by means of specialized use of the pulse-ratio test.

The writer wishes to acknowledge his indebtedness to Dr. J. T. McClintock for constant suggestions in carrying out the rather extensive program in the Physiology of Exercise. Credit is also due my graduate students who have enthusiastically carried out many of the experiments.

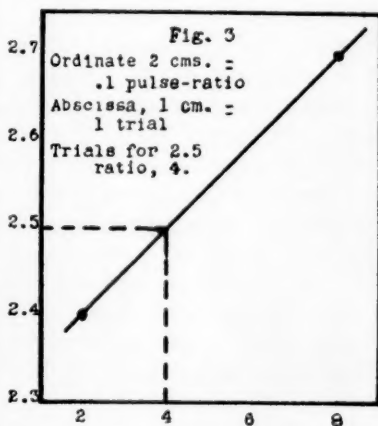
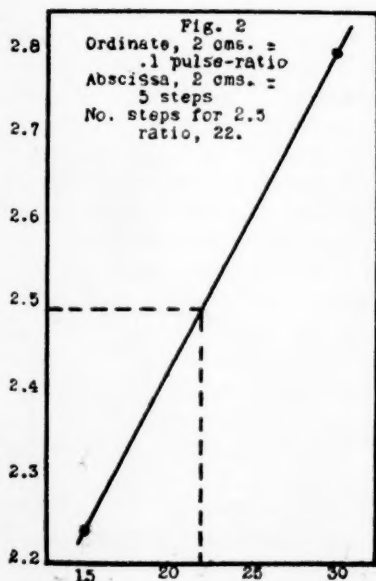
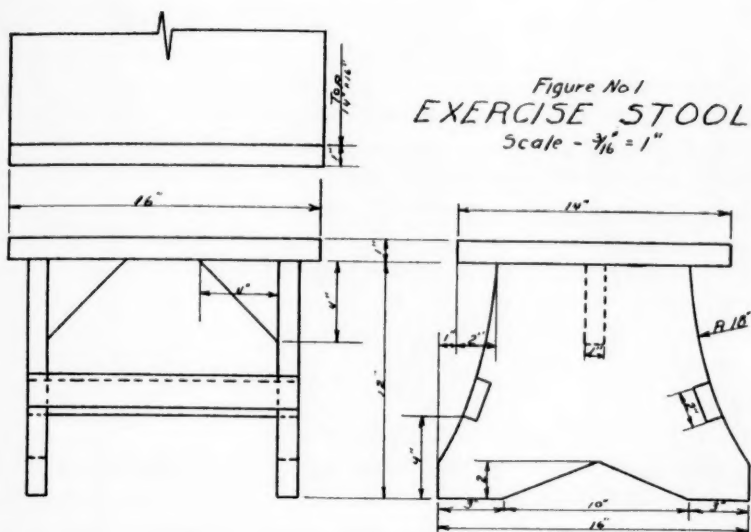


Figure 1.—This figure is a detailed drawing of the stool used for standard exercise in the pulse-ratio test.

Figure 2.—This figure shows the method for graphically determining the number of steps required for a 2.5 pulse-ratio.

Figure 3.—This figure shows the method for graphically determining the number of trials of a special exercise necessary to produce a 2.5 pulse-ratio.

Comparative Effectiveness of Formal, Informal, and Combination Methods of Instructing University Freshmen in Fundamental Muscular Skills

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Introduction

Statement of the problem. What is the comparative effectiveness of the formal, informal, and combination methods when instructing university freshmen in muscular skills? The purpose of the study is to determine, so far as possible, the comparative effectiveness of the three methods when exactly the same material is presented. The major consideration is the degree of mastery of the course content on the part of the student; a second is the relative importance of grouping the exercises according to the similarity of movement.

General method of procedure. The experiment was carried out in the department of physical education of the University of Illinois during the year 1928-1929. Four classes were selected as groups for the experiment. The methods of instruction for each group were as follows: in the formal group all activity was done as a class unit on command or at the suggestion of the instructor, the exercises being grouped according to similarity of movement; in the informal group all activity was done through individual help and suggestions, the exercises being taken up in the order as listed on the departmental instruction sheet*; in the combined group all activity was taken up in a day by day alternated sequence of the formal and informal group procedure, the exercises taken up in the order as listed on the departmental instruction sheet*; in the control group all activity was carried on by the students without any instruction, the exercises taken up in the order as listed on the departmental instruction sheet.*

* List of tumbling stunts.

- | | |
|--|--|
| 1. Cartwheel (on a line) | 12. Forearm stand (5 seconds) |
| 2. Round off | 13. Bucking broncho (5 times) |
| 3. Long dive (over 4 men on hands and knees) | 14. Head spring |
| 4. High dive (over 1 man stooped) | 15. Forward hand spring |
| 5. Neck dive (over 4 feet) | 16. Neck spring (hands behind shoulders) |
| 6. Squat stand (10 seconds) | 17. Snap up (hands on thighs) |
| 7. Elbow stand (10 seconds) | 18. Front somersault |
| 8. Head stand (10 seconds) | 19. Back bender |
| 9. Hand stand (5 seconds) | 20. Front bender |
| 10. Hand walk (10 feet) | 21. Back hand spring |
| 11. Elbow lever (10 seconds) | 22. Back somersault |

Balancing the groups. In order to eliminate some of the disturbing factors that might influence the results, the subjects were grouped as nearly as possible on the basis of equal numbers, training or lack of previous training, and equal or unequal ability. An attempt was made to equalize the beginning of each group by teaching a set of five simple but fundamental exercises, and a combination of these in a series. These preliminary exercises were not included in the course content.

The groups are presumably representative of the average freshman entering tumbling courses, as judged from their performances in the preliminary examination and from the comparison of their final examinations with the final examinations of similar groups of the preceding six semesters.

Experimental Procedure

Constant procedure for all groups. Each group was given a preliminary examination of the course content to determine how many students could do each of the exercises before receiving instruction; a preliminary inquiry to determine the amount of training in tumbling each student had had before taking the course; a preliminary set of five simple but fundamental exercises which were not included in the course content; a forward roll, backward roll, pirouette, chestroll, snap through, and a combination of these in a series; a final inquiry on practice to ascertain those who had practiced other than during the class period and the amount of that practice; and a final examination of the course content to determine how many students could do each of the exercises after receiving instruction.

The arrangement of the mats were the same for each group; a demonstration of the exercise with verbal instruction introduced each exercise; the groups were not informed of the study; each group was given an equal number of trials; four reviews were held at different intervals.

Procedure for the control group. Six students were chosen from each group for a case study to offer a check on the results of the experiment when a more objective test in the form of elements was used. Each exercise was broken up into three essential elements based upon the description of the exercises listed on the instruction sheet. The subjects selected for the case study were picked out at random according to the number of exercises they passed in the preliminary examination. An average representative group was obtained by selecting six students; two having passed none of the exercises and considered poor, two having passed two of the exercises and considered fair, and two having passed four of the exercises and considered good. These same six students from each group were given a preliminary and a final examination of the twenty-two ex-

ercises with a view of judging the improvement when the more objective test in the form of elements were used.

The variable procedure for each group. In the formal group the order of the exercises was taken up according to the similarity of movement. No individual help was given. Any request for individual help was given on a class basis by calling the class's attention to the request and giving the necessary instructions to the class. In the informal group the exercises were taken up in the order of the instruction sheet. All instructions were given individually, a process which involved group instruction, the groups varying in sizes depending upon the close proximity of surrounding students. It is possible but not probable that some students would receive no instruction and some would receive no individual instruction. In the combined group all instruction and activity was on an alternated day-by-day sequence of the formal and informal group procedure. In the control group only a demonstration of the exercise was given. The subjects were requested not to help one another with either physical or verbal aid, not to discuss tumbling with anyone at any time, not to practice outside the class period. They were requested also to get all of their information from the instruction sheets and requirements, which were posted. No commendations, encouragements, condemnations or penalties were given.

Results of the Experiments

Restatement of the problem. What is the comparative effectiveness of the formal, informal and combination methods when instructing fundamental muscular skills to university freshmen? The purpose of the study is to determine, so far as possible, the comparative effectiveness of the three methods when exactly the same material is presented. The major consideration is the degree of mastery of the course content on the part of the student; a second consideration is the relative importance of grouping the exercises according to the similarity of movement. Other related results are also given.

I. *Degree of mastery of the course content.* The amount of training in each group is small enough to indicate a practically raw group, giving some validity to the conclusion. The results are based upon the average number of exercises learned per student. The rank of the comparative effectiveness of the three methods in the degree of mastery of the course content results in the following order:

1. The informal method resulted in an average of 9.10 exercises learned per student.
2. The combined method resulted in an average of 8.13 exercises learned per student.
3. The formal method resulted in an average of 7.90 exercises learned per student.

The informal method group excelled in the number of difficult exercises learned. The following list shows the exercises listed in the gradation of their difficulty as determined from the experiment, the preliminary study and the total of the two.

| Order determined by the preliminary study | Number of students passing | Order determined by the experiment | Number of students passing | Order determined by total of the two | Number of students passing |
|---|----------------------------|------------------------------------|----------------------------|--------------------------------------|----------------------------|
| 112 students | | 120 students | | 232 students | |
| High dive | 107 | High dive | 108 | High dive | 215 |
| Long dive | 107 | Long dive | 103 | Long dive | 210 |
| Squat stand | 107 | Squat stand | 103 | Squat stand | 210 |
| Neck dive | 99 | Neck dive | 93 | Neck dive | 192 |
| Head stand | 97 | Head stand | 90 | Head stand | 187 |
| Cartwheel | 94 | Cartwheel | 71 | Cartwheel | 165 |
| Roundoff | 90 | Roundoff | 70 | Roundoff | 160 |
| Bucking broncho ... | 72 | Elbow stand | 61 | Head spring | 124 |
| Neck spring | 69 | Hand spring | 58 | Elbow stand | 123 |
| Head spring | 68 | Head spring | 56 | Neck spring | 119 |
| Elbow lever | 64 | Neck spring | 50 | Hand spring | 118 |
| Elbow stand | 62 | Elbow lever | 45 | Bucking broncho ... | 115 |
| Hand spring | 60 | Bucking broncho ... | 43 | Elbow lever | 109 |
| Snap up | 50 | Snap up | 38 | Snap up | 88 |
| Forearm stand | 45 | Front bender | 31 | Forearm stand | 68 |
| Front bender | 35 | Forearm stand | 23 | Front bender | 66 |
| Hand walk | 25 | Front somersault ... | 22 | Hand walk | 43 |
| Front somersault ... | 18 | Handwalk | 18 | Front somersault ... | 40 |
| Back somersault ... | 11 | Back somersault ... | 7 | Back somersault ... | 18 |
| Hand stand | 7 | Hand stand | 4 | Hand stand | 11 |
| Back bender | 6 | Back hand spring ... | 2 | Back bender | 7 |
| Back hand spring ... | 2 | Back bender | 1 | Back hand spring.... | 4 |

In all but four of the fifteen more difficult exercises in the gradation, the informal method had an advantage over the combined and the formal methods. In one exercise the informal method had an equal advantage with the combined method. The combined method had an advantage in two exercises and the formal had an advantage in only one.

II. *Grouping the exercises according to the similarity of movement.* The relative importance of grouping the exercises according to the similarity of movement had little effect upon the degree of mastery of the course content. The arrangement of the exercises according to the similarity of movement was used in the formal method group. As a result of the experiment, the formal method group learned the least average number of exercises per student. Because of this fact, the arrangement of exercises according to the similarity of movement may have been detrimental to the learning of the exercises.

III. *Related Results.* Results, other than those stated as major considerations, are presented for the purpose of throwing additional light upon the problem when instructing university freshmen in fundamental skills which are involved in athletics, sports, games and gymnastics and other related activities.

1. A large number of students passed the easier exercises without instruction. Out of a total of 120 students, 32 did the squat stand, 27 the head stand, 27 the long dive and 19 the high dive. In the easier exercises there is little effect from details of instruction. In the squat stand, the control group learned 21 exercises, a performance which excelled the informal and combined groups and equaled the formal; in the head stand, the control group excelled the other 3 groups by learning 17 exercises; in the long dive, the control group learned 26 exercises while the combined and formal learned 17 exercises; in the high dive the informal learned 26 and the control learned 19. However, instruction has some effect as shown by the results of the taught groups over the control group in the results of the experiment.

2. Demonstration and imitation appeared to be more effective than verbal instruction. In both the easier and more difficult exercises, the control group equaled or excelled the instructed groups in several exercises. In the roundoff, the control group equaled the combined group and excelled the formal and informal groups; in the neck dive, the control group excelled the formal and informal groups; in the squat stand, the control group equaled the formal and excelled the informal and combined groups; in the head stand, the control group excelled the other three groups; in the bucking broncho, the control group equaled the formal group; in the snap up, the control group excelled the combined group; in the front somersault, the control group excelled the combined group; in the front bender, the control group equaled the formal group.

In the case study with the average number of exercises learned per student, the results show the control and the combined method groups rank first with an average of 9.00 exercises learned.

3. The assumption that fifty trials is sufficient to learn an exercise of the course content is justified by comparing the average grades of the experiment groups with the average grades of all other sections of the tumbling courses. The average grade for sections is 3.47. The average grade for the formal group is 3.77, the informal 3.82, the combined 3.46 and the control 3.29.

4. Exercises of fundamental muscular skill as used in the experiment had a gradation of difficulty as shown by the results of the experiment and the preliminary study.*

5. The list of exercise gradation of difficulty* indicates that the

* Refer to table on page 21.

front somersault, back somersault, handspring, back bender, and the back hand spring were too difficult for class content. Out of a total of 232 students, 40 passed the front somersault, 18 passed the back somersault, 11 passed the hand stand, 7 passed the back bender, and 4 passed the back hand spring. The time and effort necessary to learn these is too great in proportion to the number of students learning them.

6. Comparing the results of the preliminary study with those of the experiment, group differences as well as individual differences are shown. (a) The informal method group ranked last; while in the preliminary study, the formal method group ranked best and the informal next best. (b) The informal method group excelled in the more difficult exercises; the control group excelled in the easier exercises. (c) The experiment shows that in the informal method group 16 students learned the snap-up, a rather difficult exercise; but in the same group only 11 learned the cartwheel, a comparatively easy exercise. There were 6 students in the group, which used the best method, who learned the front somersault, a much more difficult exercise; only 3 students of the combined method group, which was the next best method, learned the front somersault.

7. The results of the case study, based upon the average number of elements learned per student, are the same as those of the experiment. (a) The informal method resulted in an average of 29.00 elements learned per student. (b) The combined method resulted in an average of 26.83 elements learned per student. (c) The formal method resulted in an average of 21.16 elements learned per student.

Summary of Conclusions

The following conclusions are drawn in full realization of the limitations of this experiment which has been based upon a group study. The individual differences within the groups are so great that no final statement can be made concerning the best methods of instruction in such fundamental skills as are involved in tumbling. Inadequate as this study may seem to be, it offers a technique and suggests an avenue for a more complete and specific study.

1. The informal method was best as indicated by the strong evidence gathered from various tables, the results of which favored the informal method. (a) The results of the case study on elements are based upon the average number of elements learned per student. The rank of the comparative effectiveness of the three methods results in the following order.

(1) The informal method resulted in an average of 29.00 elements learned per student.

(2) The combined method resulted in an average of 26.83 elements learned per student.

(3) The formal method resulted in an average of 21.16 elements learned per student.

(b) The results of the final examination of the experiment are based upon the average number of exercises passed per student. The rank of the comparative effectiveness of the three methods results in the following order:

(1) The informal method resulted in an average of 10.20 exercises passed per student.

(2) The combined method resulted in an average of 9.80 exercises passed per student.

(3) The formal method resulted in an average of 9.36 exercises passed per student.

(c) The results of the average grades of the experiment show the rank of the comparative effectiveness of the three methods resulting in the following order.

(1) The informal method resulted in an average grade of 2.70.

(2) The formal method resulted in an average grade of 2.66.

(3) The combined method resulted in an average grade of 2.46.

(d) The results of the final examination of the preliminary study are based upon the average number of exercises passed per student. The comparative rank of the effectiveness of the three methods resulted in the following order.

(1) The formal method resulted in an average of 12.20 exercises passed per student.

(2) The informal method resulted in an average of 11.99 exercises passed per student.

(3) The combined method resulted in an average of 10.00 exercises passed per student.

2. After considering the evidence resulting from the experiment which favors the informal method, one finds much to be said for the combined method. The results of the case study tend to favor the combined method. When considering the selection of the subjects for the case study and the elements as a basis for judging the exercises, the results of the informal method are counter-balanced by those favoring the combined method.

The subjects selected for the case study were picked at random according to the number of exercises passed in the preliminary examination. A representative group was obtained by selecting six students from each method group—two having passed none of the exercises and considered poor, two having passed two of the exercises and considered fair, and two having passed four exercises and considered good. These same six students from each method group were given a preliminary and final examination of the course content with the view of judging improvement when the more objective

test in the form of elements were used. It was possible for the students of the informal group to pass the exercises by executing only one or two of the elements. The criteria for judging was from a stand to a stand and was entirely upon the basis of subjective judgment. The subjects of the case study had to execute all three of the elements to pass the exercise.

(a) The results of the final examination of the case study are based upon the average number of exercises passed. The rank of the comparative effectiveness of the three methods results in the following order.

(1) The combined method resulted in an average of 12.50 exercises passed per student.

(2) The informal method resulted in an average of 10.50 exercises passed per student.

(3) The formal method resulted in an average of 9.33 exercises passed per student.

(b) The results of the final examination of the case study are based upon the average number of exercises learned per student. The rank of the comparative effectiveness of the three methods results in the following order.

(1) The combined method resulted in an average of 9.00 exercises learned per student.

(2) The informal method resulted in an average of 8.66 exercises learned per student.

(3) The formal method resulted in an average of 7.50 exercises learned per student.

Because of the method of instruction in the informal method group, which was on the basis of individual instruction, it was possible that the major portion of instruction and aid was directed to those students who showed ability in doing the exercises. This may account for the informal method excelling in the more difficult exercises.

3. This experiment deals with motor skills involved in athletics, gymnastics, sports and games and further involves a phase of motor skills that are fundamental; therefore, the results of the preliminary inquiry justify the conclusion that tumbling exercises are a neglected phase of physical education. In the formal group none had training in the elementary grades, a fact which is likewise true for the informal and control groups; while in the combined groups only one student had had previous training in the grades. As evidenced by the analysis of various authors on tumbling, it is gradually being included in the present day trends of physical education.

4. The psychical effects of fundamental tumbling skills, according to certain authors, are satisfying and abiding in producing such attitudes as courage, persistency, nerve, pep, grit, confidence, control

and social consciousness; and such physical effects as balance, poise, muscle sense, speed, agility, initiative and ability.

5. The improvement in the composite exercise is based upon elements which range from one to three in difficulty. This range supports the assertion that many details are not necessary in the instruction and indicates that the individual can remember only a small series. These elements are present in part or whole in other related activities and offer objective data in measuring improvement in such exercises of skill as are presented in this experiment.

6. As shown in the analysis of the elements and their possible transfer to other activities, tumbling exercises directly or indirectly meet Dr. Williams' aims of physical education, ". . . to provide an opportunity for the individual to act in situations that are physically wholesome, mentally stimulating and satisfying, and socially sound."

In accepting these conclusions the reader will bear in mind the following statement made by Dr. Jesse Feiring Williams in his introduction to Martin Rogers' *Handbook of Stunts* as a blanket conclusion. "To hold that certain physical activities will produce certain results is probably beyond the limits of circumspection; for even the most cautious fails frequently to realize the influence of many varying factors that bear upon the problem of individual growth and development."

A Summary of "A Criticism of Survey Techniques in Health and Physical Education"

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I. Statement of Problem

The last decade has seen educational surveying progress remarkably in its popularity as an administrative device for improving and justifying educational procedures. However, there has been very little progress made in improving the techniques used in conducting surveys.

As early as 1910 (Boise, Idaho) we find some excellent techniques employed for surveying that part of the school program which we now call health and physical education. Yet, as late as 1929 we find a good many surveyors of health and physical education who have not availed themselves of the scientific techniques used in the Boise survey.

It is an interesting fact that the use of more acceptable survey techniques is identified with only a few surveyors, regardless of time. There has been no chronological improvement in the use or type of survey technique in health and physical education. This fact may be explained by the following reasons:

Surveyors vary in ability, training, and intent of purpose.

Standards of "acceptable" techniques change with the passing of time.

The ideas of the time change from year to year.¹

Communities change with the passing of time.¹

Communities vary, and cannot be compared.¹

As a matter of fact, even a cursory examination of typical survey reports on health and physical education causes the interested reader to wonder why the need for the improvement of techniques has never been emphasized.

The purpose of this problem is to consider critically some of the survey reports on health and physical education. Attention is directed toward the weaknesses in survey method and an attempt is made at evaluating certain representative techniques.

The scope of the problem is limited chiefly to representative techniques found in approximately one hundred surveys which in-

¹ These were suggested to the writer by Dr. C. L. Brownell, Professor of Physical Education, Teachers College, Columbia University, 1930.

cluded sections on health and physical education. The type of surveys included in the list are: (1) city, (2) rural, (3) county, (4) building, (5) state, and (6) university. The surveys range chronologically from 1910 to 1930. The criticisms of the survey techniques selected for consideration are chiefly adverse and negative.

II. Definitions

The following definitions are submitted in order that an interpretation of certain statements containing them be precise and accurate.

Survey—A method of research, the purpose of which is to study any or all aspects of education so as "to justify or modify educational procedures."

Scientific Method—That method "which, when brought to bear on a range of facts, enables us to understand them better and to control them more intelligently, less haphazardly and with less routine."

Research—"A quest for ways of thinking which constitute dependable bases and guides for further conduct."

Objective—(1) Capable of yielding the same results when the same data or method is used by another person. (2) Capable of proof. (3) Including as little personal prejudice as possible.

Scientific—That which is a result of exact observation and correct thinking. Accurate. Exact.

III. Limitations of the Study

1. The writer has never been a member of an educational survey.
2. The data in this study have been collected at different times from different sources during the past 6 years. The data collected at these earlier dates have not been available for re-checking. This also means that all phases of the problem are not based on the same data.
3. Experts in education have written little regarding survey and survey techniques. Such a lack of information forces any writer to accept the responsibility of being subjective and of being guilty of expressing his personal opinions.
4. The writer is unable to make constructive suggestions to replace all of those techniques which he has destructively criticized.
5. The problem is incomplete.
6. There is no claim that a complete analysis and interpretation of the data has been made.

IV. Why Consider This Problem?

The problem is of personal interest to the writer because of the following reasons:

1. The methods employed by surveyors in health and physical education have been loose, unscientific, and decidedly non-objective. A cursory exami-

¹ Sears, J. B., *The School Survey*. Houghton Mifflin Company, New York City. 1925. p. 4.

² Dewey, John, *The Sources of a Science of Education*. Horace Liveright and Company, New York City. 1929. p. 8, 9.

³ Raup, R. B., In an unpublished lecture at Teachers College, Columbia University, New York City. February 17, 1930.

ation of surveys suggests this statement. A careful analysis of them substantiates this hypothesis.

2. Some surveyors seem to report their work dogmatically. Others seem to assume an attitude of mysticism.

3. Surveyors in general have had a laissez-faire attitude toward the development and improvement of survey techniques.

4. They have not expressed the pregnant need for valid standards, and other scientific tools in health and physical education practices which yield themselves to objective measurement.

5. Many survey reports have been written in pedagogical terminology. Little effort has been made, it seems, to make them interesting.

The problem is of professional interest because it may lead to facilitating and objectifying surveying in health and physical education. It may also contribute to a more popular use of, and demand for scientific tools in health and physical education.

V. Sources of Data

1. Ninety-seven of the surveys including sections on health and physical education were analyzed and the various techniques noted and recorded.

2. Fifty books dealing with techniques in pure research, educational research, and surveys.

3. Three interviews with surveyors in health and physical education.

VI. Method of Attacking the Problem

Following a plan used in an earlier problem of this type, the survey techniques which emerged from an analysis of the surveys are classified under five general headings:

I. Sources of Data.

IV. Recommendations.

II. Methods of Collecting Data. V. Methods of Reporting Surveys.

III. Methods of Interpreting Data.

In order to evaluate and criticize the survey techniques objectively, the "Comparison Method" is employed. By this method, a given survey technique is evaluated and criticized by comparing it with an identical, or a similar technique in pure research or educational research. This method, as used in this problem, often consists of listing the weaknesses, limitations, or dangers of a given technique as set forth by the best thought in pure or educational research.

A. *A Criticism of Sources of Data.*

In considering the sources to which surveyors turned for their data, the criticisms are summarized as follows:

1. Some surveyors did not mention any sources of data, whatsoever.

2. Only 5% of the surveyors in the 61 surveys analyzed for sources of data, made use of even half of the available sources. (See Table I),

3. Less than half of the surveyors used such sources as (1) physical education staffs or (2) records of medical examination.

4. Only 16% of the surveyors made use of special classes in physical education.

5. Twenty-five per cent of the surveyors saw fit to use such a source as the time-schedule of physical education classes.

TABLE I

| List of General Sources of Health and Physical Education Data Which Were Used in 61 Surveys | |
|--|---------------------------------|
| General Sources of Data | Number of Surveyors Using It |
| Physical Education Course of Study | 18 |
| Health Education & Hygiene Course of Study | 13 |
| Health Textbooks | 14 |
| Medical Inspection and Examination Records | 28 |
| Health Teaching | 3 |
| Board of Health Procedures and Reports | 10 |
| Board of Education and Superintendent of Schools | 7 |
| Staff of Health and Physical Education Departments | 17 |
| Health Examination Records | 20 |
| Reports of Nurses and Dentists | 20 |
| State Laws | 16 |
| Photographs | 6 |
| School Teaching Records | 9 |
| Time Allotment and Schedules | 15 |
| Health Tests and Questionnaires | 9 |
| Buildings, Grounds, Gymnasium, Pool, etc. | 50 |
| Cost and Finance | 13 |
| Publications | 2 |
| Athletics and Athletic Association | 10 |
| Sanitary Surveys and Codes | 4 |
| Health Agencies | 3 |
| Contests, Field Days, Boy Scouts, etc. | 5 |
| Special Classes | 10 |
| Recreational Departments | 6 |

6. Surveyors have not expressed a need for records of physical-motor abilities and achievements.

7. There are scientific results from the exact sciences which may be used as sources.⁶

8. The findings and hypotheses in psychology, sociology, and economics form sources which may be valuable to the surveyor.

9. Surveyors have not expressed a need for valid standards of health and physical education.

10. The use of moving picture records of activities and physical education procedures has not been used to any degree.

11. Only nine surveyors used the results of health questionnaires and tests.

12. Data taken from the personal experience of the leading physical educators form original sources of that phase of health and physical education which relates to the social interplay between teacher and pupil, from the teacher's point of view. This should prove to be a particularly valuable source of data for surveyors unfamiliar with the field of health and physical education.

B. *A Criticism of Methods of Collecting Data.*

In considering the survey techniques which occurred in the methods of collecting data, used by surveyors, it was possible to use the Comparative Method to advantage. For example, the technique of *Observation* is found to possess the following limitations, when compared to a high standard of research.

1. A surveyor may lack the ability to see as well as perceive through the senses.⁷

2. A surveyor may not be observing from the proper place.⁸

3. The surveyor may lack the necessary background in health and physical education and thus not appreciate the comprehensive units worthy of observation.⁹

⁶ Dewey, John, *The Sources of a Science of Education*. Horace Liveright and Company, New York City. 1929.

⁷ Clark, E. L., *The Art of Straight Thinking*. D. Appleton and Company, New York City. 1929. pp. 108-109.

4. There may be psychic and emotional factors which inhibit accurate observation.⁷

5. A surveyor may lack the ability to segregate that part of a given activity which is most important or pertinent at a given moment.⁸

6. An obvious, though infrequent hindrance to accurate observation among surveyors is that of functional and structural defects of vision and possible accompanying disturbances.⁹

7. A surveyor may not be alert—not only while observing but at other times when hints and suggestions are available, and capable of yielding significant data.¹⁰

8. Another difficulty which an untrained observer may encounter is that of effectively playing the role of an observer. Not only must he rule out biases and prejudices, but he must continually resolve to remain alert, unbiased, and open-minded.

9. Experience in educational surveying may not be a justification for the reliability of a surveyor's observations in health and physical education.

10. It is preferable to have more than one observer judging a given situation.

11. A surveyor may fail to choose typical and representative situations to observe.

12. A surveyor may fail to use available tools and techniques which yield more accurate and objective results than observations.

Surveyors may encounter the following difficulties in collecting data:¹¹

"(1) Securing reliable data, discriminating between opinion and fact.

"(2) Selecting relevant material and distinguishing between useless and unnecessary details and facts, and factors that are really important.

"(3) Relating facts observed and results measured to peculiar conditions in the school or locality.

"(4) Selecting standards of comparison that are valid for the particular school.

"(5) Distinguishing between facts or conditions closely related in time and place and casual relationships.

"(6) Describing accurately and adequately the facts and conditions.

Table II is a brief summary of the general methods of collecting health and physical education data used by surveyors:

A brief summary of the criticisms of the representative methods of collecting data selected for consideration includes:

1. Observation, as a method of collecting data, has limitations of such a nature that it is not used when a more objective technique is available.

2. The Score Card is used as a tool of precision by some surveyors rather than as a guide. It is important to know how the Card was used, and by whom.

3. The job, or activity analysis technique might be used to a greater extent where the contemporary status is all that is desired.

4. Surveyors collect data which need to be compared to standards, if they become relevant to the survey. These standards are usually lacking and thus data is not pertinent.

⁷ Clark, E. L., op. cit. p. 115.

⁸ Clark, E. L., op. cit. p. 120.

⁹ Clark, E. L., op. cit. p. 112.

¹⁰ Burt, E. A., *Principles and Problems in Right Thinking*. Harper and Brothers, New York City, 1928. p. 101-104.

¹¹ Clark, E. L., op. cit. p. 110-111.

¹² An Outline of Methods of Research with Suggestions for High School Principals and Teachers. Bureau of Education Bulletin No. 24 (1926). Bureau of Education, Washington, D. C.

TABLE II

| List of General Methods of Collecting Health and Physical Education Data Which Were Used in 96 Surveys | |
|---|---------------------------------|
| General Method of Collecting Data | Number of Surveyors Using It |
| Analysis of Course of Study | 15 |
| Analysis of Extra-Curricular Activities | 16 |
| Job Analysis | 12 |
| Observation | 48 |
| Inspection | 42 |
| Conference and Interview | 25 |
| Study of Records and Reports | 29 |
| Study of Textbooks | 4 |
| Study of Professional Training Staff | 3 |
| Study of School Feeding | 3 |
| Study of School Finances | 9 |
| Examinations—Medical and Dental | 9 |
| Photographs | 19 |
| Study of Administration | 3 |
| Activity of Pupils | 2 |
| Questionnaires | 10 |
| Health Agencies | 10 |
| Experiments | 2 |
| Tests of Building Environment | 11 |
| Score Cards | 26 |
| Analysis of Materials | 3 |

5. It is difficult to devise techniques of collecting data which yield results that are pertinent to health and physical education procedures.

6. Surveyors have not expressed a need for tests and measurements which would aid them in collecting data.

C. *A Criticism of the Methods of Interpreting Data.*

In a sense, it is impossible to criticize the interpretations made by the surveyors. This is true because little data is ever recorded. Furthermore, the environmental, educational, and social settings from which the data were collected are known only to the surveyor and cannot be duplicated.

However, certain methods of interpreting data found in Table III, have been selected for critical consideration.

TABLE III

| List of General Methods of Interpreting Health and Physical Education Data Which Were Used in 42 Surveys | |
|---|---------------------------------|
| General Methods of Interpretation | Number of Surveyors Using It |
| Reference to Expert Opinion | 23 |
| Surveyors' Opinion | 34 |
| Survey Staff Opinion | 12 |
| Current Practice | 11 |
| Accepted Standards | 21 |
| Comparison with Other Cities | 22 |
| Comparison with Other Studies | 12 |
| Analysis by Chart | 25 |
| Reference to Scientific Evidence | 4 |
| Verbatim Report of Conferences | 1 |
| Internal Comparison as to | |
| Physical Defects | 1 |
| Playground and Gymnasium Space | 3 |
| Health Knowledge and Habits | 1 |
| Reference to Abundant Evidence | 1 |
| Comparing Teacher's Findings with M.D. | 1 |
| Comparison with State Law Requirement | 4 |
| Comparison with Best Prevailing Practice | 12 |
| Comparison with Factual Materials | 15 |
| Comparison with Other States | 3 |
| Comparison with Other Reports | 2 |
| Estimation of Costs | 10 |
| Reference to Scientific Methods | 7 |

1. The surveyor's personal opinion is necessary in the interpretive process. However, to fail to continually make use of all available and pertinent data as guides and bases for this reflective process is to ignore the significance of the meaning of interpretation in research.

2. When a surveyor compares two sets of data from similar situations, it is held that the factors of similarity be (a) numerous, (b) basic, (c) actual and real, (d) that these similar factors far outnumber and (e) outweigh the dissimilar ones.¹⁸

3. Some surveyors compare their data to "accepted standards."

(a) There are extremely few accepted standards in physical education, although in health education some standards have been set up.

(b) Even though there were available and acceptable standards in health and physical education, the data which most surveyors used was so carelessly collected that it could not be legitimately compared to data carefully collected (as would be the case in the construction of standards).

(c) The recency of the standards is another point to consider in using this method.

(d) The purpose for which the standards were intended may not be precisely relevant to the surveyor's data.

(e) The surveyor should know whether the standard represents the maximal or minimal.

4. Some surveyors compare their data to "expert opinion."

(a) In using expert opinion as a method of interpreting data, the surveyor should set up some criteria of "expertness."

(b) It is significant to know if there is a consensus of expert opinion on a given point, or if a given expert represents the minority.

(c) It may be valuable to know the date when the opinion was expressed.

(d) The expert may not have expressed an opinion on precisely the point under discussion.

(e) The expert may be too intimate, or too unfamiliar with the point in case to render an unbiased opinion.

5. Interpreting data in terms of *current practice* may be criticized:

(a) Current practice may not represent the best available practice.

(b) Current practice may be contradictory in different sections of the country.

(c) Current practice is not to be confused with common practice.

(d) It is sensitive and responsive to local traditions, ideals, interests, etc.

D. *A Criticism of the Techniques in Making Recommendations.*

The making of recommendations is intimately bound up with the interpretation of data. A few further criticisms may be mentioned which are more directly pertinent to recommendations.

1. Some surveyors seem to "see into" situations, conditions which justify their making recommendations which conform to favorite patterns of thought and action.

2. Some surveyors may be recognized for making "type" recommendations. These seem to be made irrespective of the peculiarities of given communities.

3. Surveyors should submit the data and assumptions used in making their recommendations.

4. Some surveyors seem to have based their recommendations on insufficient data.

5. Recommendations for facilities and equipment should be made with an appreciation of the school population, financial status of the school, pertinent climatic conditions, and the level of physical educativeness of the children in the locality.

¹⁸ Clark, E. L., op. cit. p. 197, 198.

6. In making recommendations many surveyors should consider the fact that they secured but a "flash" of the situation and not a picture. This "flash" may not even be representative.

7. Reliable data, carefully collected, do not, ipso facto, mean valid recommendations. Errors in interpretation are easily made.

E. Criticisms of Methods of Reporting Survey Data.

The following points briefly indicate the weaknesses in the methods of reporting survey data.

1. All pertinent data is seldom reported.
2. Loose reporting leads to hazy conceptions of the survey.
3. Failure to report sources is a common fault. This error justifies a questioning of the reliability of the sources.
4. The report should be written with the type of the reader in mind for whom it is intended.
5. Survey reports should be complete enough to serve as guides to subsequent surveyors. Most of them are incomplete. This explains, in part, the lack of chronological improvement in survey techniques.
6. Surveyors fail to define terms.
7. It is often difficult to assign certain data to the section of the problem to which it refers.
8. It is intellectually honest to report all sources of data.
9. The terminology in most survey reports is too academic to interest persons outside of the educational circles.
10. A concise tabulation of the sources and methods used by the surveyor is an unknown procedure.

VII. Conclusions

From the foregoing consideration of the techniques used by surveyors in health and physical education, and from a consideration of best practice in research, the following general conclusions seem justified:

1. That some of the techniques used in surveying physical education are unsatisfactory and can be improved upon.
2. That many surveyors need training in the use of more acceptable techniques.
3. That there is a place in surveying for the utilization of the services of research experts.
4. That surveyors should submit all pertinent data, and state all important assumptions which they may make in the survey report.
5. That surveyors unfamiliar with the field of physical education should freely consult experts in this field.
6. That surveyors might well emphasize the need for well-kept records of departmental activities.
7. That it would be valuable to physical education if at least one professional department gave acceptable training in such research techniques as are used in surveys.
8. That surveyors should have more time than is usually given them in conducting their work, and in interpreting their data and making their recommendations.
9. That some surveyors need to diligently remind themselves that personal

biases, experiences, etc., are apt to cause them to "see into" situations, things which do not actually exist in these situations.

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Prevalence of and Correlations Between Physical Defects and Their Coincidence with Functional Disorders

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I. Purpose

It is the purpose of this thesis—

1. To show the prevalence of physical defects during adolescence and to present statistical evidence to support the common observations and opinions of physiotherapists and of directors who work in the field of Corrective Physical Education.
2. To summarize these statistics in groups so as to make obvious to high school principals and superintendents the advisability and real necessity of having adequate physical examination, and of backing up such examination with real remedial work of both group and individual types, apart from and in addition to the broader athletic and recreational program.
3. To point out and to emphasize the important changes in body structure and functional disorders that can be due to postural defects.
4. To correlate and bring together the findings of this author and of others in similar studies made in theses at the University of Wisconsin.

II. Previous Studies

To satisfy purpose 4—correlation of the findings of others making similar investigations at the University of Wisconsin so that a rounded out study of physical examination correlations might be available for further therapeutic study—the author carefully went through, and in tables A, D, H, L, and M made use of, the data and findings of the other recent authors.

In 1926 A. M. Moss crop made a study of "Posture Comparisons 1920 vs. 1926" in which posture grades and the number of years of Physical Education prior to entering the University were the outstanding data (Tables A and D). She found the best posture grades to be associated with the largest number of years of physical education.

In 1926 Florence L. Merideth published a study on "Hygiene" in which her conclusions as to the causes and symptoms of dysmenorrhea are of interest here. Her findings showed the situation to be due to a disturbed functioning of the organs rather than to a diseased condition, although in some cases the latter was true, and her most commonly found direct causes were poor posture and constipation.

In 1928 Mildred Bennion of University of Wisconsin made a study of "Pelvic Obliquity in Relation to Menstrual Conditions" and measured the pelvic tilt with a special set of calipers known as the "Mosher Pelvic Obliquimeter." She found "that cases having normal menstrual periods tend to be grouped in the center of the angle scale, and that as severity of the menstrual conditions increase the range on the scale increases." This indicates that the extreme pelvic tilts are coincident with menstrual disorder. She also made mention of another important point, namely, that "the low correlation between increase in pelvic obliquity and increase of lumbar curve when shoes are put on indicates a negligible relationship which is somewhat surprising." Obviously some segment or segments of the body must compensate for the heel, and the higher the heel the greater the compensation. Such compensation was once generally thought to take place in the lumbar region and therefore to increase the forward and downward tilt of the pelvis (increase angle of obliquity) yet Miss Bennion's actual measurement of the angles failed to show such correlation. Also it is often noted that many people who never wore high heels have lordosis. This leads to the conclusion that compensation for heels must take place elsewhere than in lumbar spine.

In 1930 Helen Gilman and Margaret Mellody undertook to find this point of compensation in a study of "The Accomodation of the Body to the Height of the Heel and its Coincidence with Menstrual Disorders." By measuring the distance of various body segments, from a set perpendicular and by taking the angles of instep, knee, hip, and head, they found this point of compensation for high heels to be primarily in the knee.

In 1929 H. G. Zingsheim, in a study of "Menstrual Disturbances and their Coincidence with Postural Defects and Extremes of Weight," in which this author took a part, showed there was a decided correlation between menstrual disorders and defects in the antero-posterior posture deviations.

This author has tried to present this chain of related studies and to add links on the relation of menstrual disorders to various lateral as well as antero-posterior defects, on the exact percentages of all sorts of postural defects so as to provide statistical evidence for the increase of corrective and remedial work, to show the correlations that exist between antero-posterior, lateral and menstrual disorders,

to show correlation of defect with sport activities of the freshman year, and to make several individual case studies to prove that these correlations exist within the single individual. Her summaries of results, conclusions, and recommendations bind all these studies together.

III. Criteria Used in Physical Examinations

All freshman women entering the University of Wisconsin are given two thorough examinations, one medical and one physical, in the fall; in most cases they are also given a follow-up examination the next spring. Examination of body balance and of the relationship of one part to another, using the position of the body axis (the spine) as a guide, shows numerous possible deviations.

Considering good posture as a whole we have many good authorities, among which Goldthwait is prominent. He says,

"In the upright position the poise or attitude in which there is the least strain, and which is consequently the correct attitude, is with the body held so that it is made as tall as possible without raising on the toes. In this position the head is erect, the shoulders are back and down so that their center is posterior to the center of gravity, the chest is high, the abdomen is flat and the spinal curves are slightly convex backward in the dorsal region and convex forward in the lumbar region. The pelvis is inclined forward so that the axis from the promontory of the sacrum to the top of the pubic bones is downward and forward 30 degrees from the horizon, the inclination of the sacrum being downward and backward so that the axis of the pelvis is at right angles with the plane of the brim of the pelvis, or about 60 degrees from the horizon..... The knees are straight and the weight is received at the foot upon the astragalus (talus) with the posterior calf muscles tight, so that the heels rest lightly, and the chief strain is thrown upon the outer border of the feet. The muscles of the trunk are in such balance that neither the anterior or posterior group is strained and but a few ligaments are under tension. The viscera are held in positions most favorable for their function."

Viewed from the side we get the antero-posterior aspect of the spine which shows three normal curves. They are, as described by Lovett, the cervical curve in the neck and cervical region which is a fairly mobile curve and can be straightened by suspension; second, the dorsal curve in the shoulder blade region formed chiefly by the bodies of the vertebrae—rigid and cannot be obliterated; and third, the lumbar curve in lower back region produced mainly by the great anterior height of the intervertebral discs and therefore very mobile.

When a plumb line is dropped from the ear (mastoid process) it should bisect the body into anterior and posterior halves at the following points according to Lovett: middle of the mastoid process, tip of the shoulder, the great trochanter, head of the fibula, and the external malleolus. These points serve in physical examination as the index for the line in which lies the center of gravity of the body.

This standard is not set arbitrarily or for any aesthetic reasons, but represents the position of easiest balance, best leverage and least friction with consequently greatest efficiency in energy expenditures;

also the most favorable position for proper functioning of thoracic and pelvic organs. Speaking of balance, Bancroft finds in her study of 150,000 New York school children that it is the natural position, taken for balance, of the child under third grade before seating and other abnormal conditions make for change.

Viewed from the rear, and aided by palpation as well as inspection, the spine should be an absolutely straight line with no lateral deviation, both hips and both shoulders should be level and the muscles of the back should be developed symmetrically.

Variations from the plumb line aforementioned are called Antero-posterior (A-P) defects; variations from the straight line of the spine as viewed from the rear are called Lateral.

Summarizing briefly and quoting another authority, Bowen and McKenzie, "we may say that the ideal standing position is one in which all the body segments, from head to ankles, form an approximately straight line."

Those antero-posterior and lateral standards are then the criteria used in the physical examinations at the University of Wisconsin from which the data for this study were taken.

IV. Method of Examination and Grading

The antero-posterior group examination consisted of head, dorsal, lumbar and abdomen. The lateral group consisted of displacement (body weight line displaced), deviation (spinal curvature or lateral deviation from perpendicular), and rotation (showing bony displacement and rotation of the vertebral segments). Hips, shoulders, feet, and menstrual history (period and pain) made up the remaining groups.

Grading was done on a basis of the deviation from the normal line and such deviation was classed as from 1 to 4 degrees from normal.

Posture grades of A were given if there were not more than 4 items of deviation of 1 degree each, and deviations of 2 degrees were allowed in several less important groups (feet). B, C and D grades contained more than four 1 degrees and also the 2, 3, and 4 degree deviations, a carefully worked out scheme governing the determination.

V. Procedure in Tabulating and Correlating

The tables which follow represent facts taken from the physical examination cards and arranged in tabular form by various groups according to the studies being made.

Each table is labelled as to the year the examination took place and the percentages are figured on the total number examined at

that time. In several instances distinction was made between the entire group examined in the fall and that part of the group which, after having been examined in the fall was again examined in the spring. For example, in the year 1928-1929 there were 793 cases examined in the fall while of these only 504 were re-examined in the spring. For the purpose of showing the necessity of having preventive and remedial work done in the secondary schools, the 793 group is used; for the purpose of showing per cent of improvements, etc., obviously only the 504 could be used.

Data was obtained from the author's own personal study in the 1928-1929 tables, and in many cases she took part in the actual examination of the 793 cases; from the work of the author and of H. G. Zingsheim in the latter's 1929 thesis in which 2000 cases were studied; from the work sheets and thesis of Gilman and Melody on relation of heel height to body position 1930; from the study of A. Mossdrop on posture grades 1920 vs. 1926; and from the author's own study of 1300 all-university cases made in 1928 for a departmental report.

VI. Physiological Significance of Anatomical Deviations

When bad antero-posterior deviations occur (forward head, round shoulders, hollow chest, hollow back, protruding abdomen, sagging knees), there is a disturbance of body balance which results in strain or pressure on muscles, blood vessels, and nerves, and in consequent impairment of organic functioning. Lungs are cramped and incompletely exercised, nerve trunks are pressed upon as they leave each spinal segment due to displacement of these segments and to change in the shape of the intervertebral discs, and pelvic organs are cramped by the changed angle of the pelvis and consequent weight of the abdominal viscera pressing downward upon them.

Menstrual disorders occur, both as to abnormal and irregular periodicity and as to pain and related pathological symptoms, owing to anatomical disturbance in relationships of blood and nerve supply, visceral pressures, and to changed position of the uterus itself.

Taking up lateral deviations which are even more serious and far reaching in physiological effects than antero-posterior ones, let us refer to Lovett who defines scoliosis as...

"...the name applied to a condition in which any series of vertebral spinous processes show a constant deviation from the median line of the body, a deviation always accompanied by an element of twisting. In certain rare cases the twisting may be the predominant appearance. Deviation of a single vertebrae from the median line does not constitute scoliosis.

"Although scoliosis is generally studied and classified as a deformity of the spine, the laws of equilibrium of the body are such that any deviation of the

vertebral column must disturb the whole balance of the body, and scoliosis is, therefore, accompanied by compensating lateral displacement of the pelvis and legs. In this wider sense scoliosis is to be regarded as a deformity of the whole body, especially manifest in the spine.

"Anything which causes any part of the body to be held in an asymmetrical position will cause a lateral deviation of some part of the spine...When such a curved position becomes habitual for any reason...there exists in the adaptive character of bone a reason why this constantly assumed malposition should make a change in the shape of the bones in a growing child and that these changes should become fixed."

It should be known that a lateral curve barely discernible to the eye means a curvature about three times greater interiorly with great effect upon nerves, blood vessels and organs.

Dr. Carl Nicoladoni of the University of Graz has made a most interesting study which illustrates the seriousness of this organic displacement due to lateral curvature. It is typical of hundreds of similar cases familiar to doctors and to physiotherapists in the United States as well. Dr. Nicoladoni says:

"There are alterations of figure and posture. First of all lung and stomach cavities become so much the shorter as the spinal column loses in length. The lowest ribs come in contact with the pelvic brim and the stomach gets broader and shorter as the diaphragm is pressed up. The right thorax, (in a right dorsal, left lumbar curve), becomes narrower and the right lung made smaller and partially useless. The shortened thorax resting upon the pelvis, with its left ribs protruding anteriorly, the liver is pressed to the right, the stomach lies vertically and reaching far downward with a vertical small curvature and with the transverse colon lying near the symphysis. The left half of the thorax is spacious and the heart though sound lies horizontal; conversely the right side is narrowed and much smaller lying within the cavity...The aorta lying within the cavity on the concave side of the spinal curve seems to be pushed downward by the fore part of the vertebral bodies...The psoas muscle of the left side is spindly and weakened...The hypertrophy and dilation of the heart of a person with scoliosis are well known and are produced by the partial wasting of the lungs and the sharp angles of the aorta which are in turn produced because this vessel accompanies the curvature of the spinal column to which it is connected."

The following tables will show that even slight antero-posterior deviation (not always considered of physiological importance by physical directors) has a high percentage lateral correlation and presents more serious aspects than merely aesthetic consideration. Both antero-posterior and lateral have high percentage menstrual disorder correlation, showing relationship between contour and symmetrical balance of the body and the static relation of thoracic and pelvic organs.

Referring again to McKenzie as to the causes of this lateral curvature, he says,

"The causes of scoliosis are both congenital and acquired. Among them may be mentioned wry neck, defective hearing or vision, asymmetry or faulty development of the bones, rickets, arthritis, infantile paralysis...and other

causes. These cases are the least amenable to exercise except as an accessory to treatment. But it is to bad posture by long continued standing or sitting or lying, joined with the carrying of weights in the hands (and books on one hip or arm) or suspended from the shoulders, that we must look for the origin of the vast majority of cases which may be classed under the general heading of scoliosis of fatigue. Frequent faults in standing, as the habitual use of one leg as a base with the other as a prop, produce the C-shaped curve...Also the common habit of sitting on one foot."

To make a final quotation from Goldthwait on the subject:

"If used rightly the physical function will be more perfectly performed, the mental processes will be greater, and the spirit of the individual must be finer if expressed through a body properly formed and used. It has caused no surprise to find Washington and Lincoln poised so that there would be no waste from the improper use of the physical frames with which they were endowed."

VII. Tables

A. Study of Posture Grades. 1920 vs 1926. (Moss crop)

Increase in No. A's from 2% in 1920 to 18% in 1926.

Increase in No. B's from 28% in 1920 to 45% in 1926.

Decrease in No. C's from 51% in 1920 to 27% in 1926.

Decrease in No. D's from 19% in 1920 to 9% in 1926.

B. Posture Grades Freshmen. 1928-1929

Fall-Spring

| | | | |
|----------------|----------------|----------------|----------------|
| A to A .....42 | B to A .....44 | C to A .....22 | D to A .....19 |
| A to B .....36 | B to B .....46 | C to B .....36 | D to B .....33 |
| A to C .....22 | B to C .....55 | C to C .....38 | D to C .....25 |
| A to D .....9 | B to D .....21 | C to D .....22 | D to D .....34 |

| | Fall | Spring | Fall | Spring |
|----------------|------|--------|------|--------|
| A Grades | 109 | 127 | 21% | 25% |
| B Grades | 166 | 151 | 33% | 30% |
| C Grades | 118 | 140 | 23% | 28% |
| D Grades | 111 | 86 | 23% | 17% |
| | 504 | 504 | 100 | 100 |

Summary of Changes, Fall vs Spring

| | | |
|-----------------------------------|-----|------|
| Number remaining stationary | 160 | 32% |
| Number with grades improved | 179 | 35% |
| Number with grades lowered | 165 | 33% |
| Number graded | 504 | 100% |

C. Posture Grades Freshmen. 1929-1930.

Fall-Spring

| | | | |
|-----------------|----------------|----------------|----------------|
| A to A .....46 | B to A .....91 | C to A .....47 | D to A .....31 |
| A to B .....155 | B to B .....84 | C to B .....62 | D to B .....42 |
| A to C .....26 | B to C .....31 | C to C .....36 | D to C .....24 |
| A to D .....21 | B to D .....41 | C to D .....43 | D to D .....78 |

| | Fall | Spring | Fall | Spring |
|----------------|------|--------|------|--------|
| A Grades | 248 | 215 | 29% | 25% |
| B Grades | 247 | 343 | 29% | 40% |
| C Grades | 188 | 117 | 22% | 14% |
| D Grades | 175 | 183 | 20% | 21% |
| | 858 | 858 | 100 | 100 |

PREVALENCE OF PHYSICAL DEFECTS

43

Summary of Changes Fall vs Spring

| | | |
|-----------------------------------|-----|------|
| Number remaining stationary | 244 | 28% |
| Number with grades improved | 297 | 35% |
| Number with grades lowered | 317 | 37% |
| Number graded | 858 | 100% |

D. Years Previous Physical Education 1920 vs 1926 (Moss crop)

Decrease in No. students entering with 0 and 1 year P.E.
 About the same number entering with 2 and 3 years P.E.
 Increase in No. students entering with 4 and 5 years P.E.

E. Years Previous Physical Education vs Posture 1928-29

| Yrs. P.E. | A Grade | B | C | D | |
|--------------|---------|----|----|----|-----|
| 1 | 10 | 11 | 21 | 21 | 10% |
| 2 | 27 | 49 | 26 | 27 | 20% |
| 3 | 18 | 24 | 21 | 14 | 12% |
| 4 | 57 | 72 | 58 | 42 | 35% |
| 5 plus | 12 | 26 | 12 | 8 | 9% |
| None | 20 | 33 | 18 | 21 | 14% |

Total No. Cases, 639.

Average years P.E. of A-B grades, 3.38

Average years P.E. of C-D grades, 3.00

F. Details of Examination Fall 1928-29 (793 Cases)

Antero-Posterior Defects

| | Head | Dorsal | Lumbar | Abdomen |
|-----------------|---------|---------|---------|---------|
| 1 degree | 491 | 351 | 287 | 423 |
| 2 degrees | 214 | 167 | 95 | 113 |
| 3 degrees | 17 | 47 | 20 | 29 |
| | 722-91% | 565-77% | 402-50% | 565-77% |

Lateral Defects

| | Displ. | Dev. | Rot. | Hips | Shoulders |
|-----------------|---------|---------|---------|---------|-----------|
| 1 degree | 204 | 395 | 273 | 312 | 449 |
| 2 degrees | 43 | 52 | 26 | 18 | 60 |
| 3 degrees | 9 | 5 | 7 | 1 | 4 |
| | 256-32% | 452-57% | 306-38% | 331-41% | 513-64% |

G. Details of Examination Fall 1929-30 (828 Cases)

Antero-Posterior Defects

| | Head | Dorsal | Lumbar | Abdomen |
|-----------------|---------|---------|---------|---------|
| 1 degree | 386 | 256 | 155 | 319 |
| 2 degrees | 141 | 71 | 49 | 106 |
| 3 degrees | 7 | 3 | 2 | 5 |
| | 534-62% | 330-38% | 206-24% | 430-50% |

Lateral Defects

| | Displ. | Dev. | Rot. | Hips | Sh. |
|-----------------|---------|---------|---------|---------|---------|
| 1 degree | 117 | 360 | 341 | 368 | 396 |
| 2 degrees | 70 | 62 | 43 | 22 | 16 |
| 3 degrees | 9 | 3 | 3 | 2 | 1 |
| | 256-29% | 425-49% | 387-45% | 392-45% | 413-48% |

H. Summary of 2,000 Cases. Study of 1927 to 1929. (Zingsheim)

| | |
|---|-----|
| Increased Cervical Curvature (forward head) | 74% |
| Increased Dorsal Curvature (kyphosis) | 63% |
| Increased Lumbar Curvature (lordosis) | 49% |
| Sagging or Protruding Abdomen (ptosis) | 67% |

I. Comparison of Fall and Spring Exams. 1928-29. (504 Cases)

| Antero-Posterior Defects | | | | | | | |
|--------------------------|---------|---------|--|-----------|---------|--|--|
| Head | | | | Dorsal | | | |
| | Fall | Spring | | Fall | Spring | | |
| 1 degree | 330 | 280 | | 238 | 179 | | |
| 2 degrees | 159 | 115 | | 109 | 74 | | |
| 3 degrees | 11 | 13 | | 27 | 17 | | |
| | 500-99% | 408-80% | | 374-74% | 270-53% | | |
| Lumbar | | | | Abdomen | | | |
| | Fall | Spring | | Fall | Spring | | |
| 1 degree | 189 | 131 | | 284 | 174 | | |
| 2 degrees | 69 | 26 | | 69 | 55 | | |
| 3 degrees | 14 | 6 | | 19 | 13 | | |
| | 272-54% | 163-33% | | 372-74% | 242-48% | | |
| Lateral Defects | | | | | | | |
| Displ. | | | | Dev. | | | |
| | Fall | Spring | | Fall | Spring | | |
| 1 degree | 131 | 126 | | 251 | 259 | | |
| 2 degrees | 29 | 31 | | 32 | 26 | | |
| 3 degrees | 6 | 11 | | 4 | 5 | | |
| | 166-33% | 168-33% | | 287-57% | 290-57% | | |
| Rot. | | | | Shoulders | | | |
| | Fall | Spring | | Fall | Spring | | |
| 1 degree | 173 | 224 | | 295 | 304 | | |
| 2 degrees | 17 | 16 | | 50 | 37 | | |
| 3 degrees | 5 | 2 | | 2 | 0 | | |
| | 185-37% | 242-48% | | 347-69% | 341-68% | | |
| Hips | | | | Shoulders | | | |
| | Fall | Spring | | Fall | Spring | | |
| 1 degree | 202 | 237 | | 295 | 304 | | |
| 2 degrees | 10 | 10 | | 50 | 37 | | |
| 3 degrees | 0 | 4 | | 2 | 0 | | |
| | 212-42% | 251-50% | | 347-69% | 341-68% | | |

Of these 504 cases, 97 took Corrective—18%.

J. Individual Case Study. (504 Cases. Fall 1928 vs Spring 1929)

| Fall grades | Spring grades Improved | | Same | | Worse | |
|------------------|------------------------|------|------|------|-------|------|
| | A.P. | Lat. | A.P. | Lat. | A.P. | Lat. |
| 0 degree | 0 | 0 | 0 | 0 | 15 | 65 |
| 1 degree | 8 | 43 | 16 | 67 | 20 | 69 |
| 2 degrees | 26 | 45 | 28 | 47 | 38 | 32 |
| 3 degrees | 58 | 37 | 23 | 11 | 23 | 2 |
| 4 degrees | 67 | 16 | 13 | 7 | 27 | 3 |
| 5 degrees | 35 | 7 | 9 | 0 | 8 | 0 |
| 6 degrees | 20 | 2 | 4 | 0 | 3 | 0 |
| 7 degrees | 29 | 0 | 1 | 0 | 1 | 0 |
| 8 degrees | 11 | 0 | 1 | 0 | 0 | 0 |
| 9 degrees | 11 | 1 | 0 | 0 | 0 | 0 |
| 10 degrees | 6 | 0 | 0 | 0 | 0 | 0 |
| 11 degrees | 2 | 0 | 0 | 0 | 0 | 0 |
| 12 degrees | 1 | 0 | 0 | 0 | 0 | 0 |
| | 274 | 150 | 95 | 132 | 135 | 171 |
| | 54% | 33% | 19% | 30% | 27% | 37% |

Of the 504

97% had some A.P. score.

77% had some Lat. score.

28% of the A.P.'s were serious (of 4 degrees or more).

8% of the Lat.'s were serious (of 4 degrees or more).

Of the 489 A.P.'s in the Fall there were still 445, 88% in Spring.

Of the 388 Lat.'s in the Fall there were still 292, 78% in Spring.

Of the 79 cases in the group, 16%, who took Corrective—

60 or 76% improved their A.P. defects.

41 or 52% improved their Lat. defects.

10 or 12% stayed the same in A.P.

22 or 27% stayed the same in Lat.

13 or 16% became worse in A.P.

17 or 21% became worse in Lat.

K. General Defects Summary. 1300 Cases all Grades University 1929

1300 Cases, being the first half of the alphabet, exclusive of the girls taking corrective (really then of the 125 worst cases).

62.4% had A.P. defects, of which 11.4% were bad.

52.6% had Lat. defects, of which many were complex "S" curves.

52% had foot defects, of which 11% were bad.

14% had a grade of A without any defects.

19% had a grade of A if foot defects were not counted.

Most of the medium and bad degree A.P. Cases also Laterals.

Most of the lateral cases were also in the group having bad feet.

With the 125 "Corrective Class" cases added, all per cents would have been higher as each of those had more than one bad defect.

L. Menstrual Study. 2000 Cases. 1928 and 1929. (Zingsheim)

Interval or Period—

At normal interval of 28 to 30 days65%

Below normal interval of 28 to 30 days15%

Above normal interval of 28 to 30 days 6%

Irregular14% 35%

Pain

With pain just preceding or during period45%

Of these suffering severe pain14%

Of these confined to bed 6%

Of these nausea and vomiting 8%

No Pain55%

Region of Pain

Abdomen76%

Back18%

Cramps 8%

Comparison with 1928 Study of 793 Cases with period disorder less than 22

or more than 31 days28%

With pain47%

M. Study of Low vs High Heels. 120 Cases of Each. (Gilman and Melody, 1930)

| | Low Heels | High Heels |
|--|--------------------|------------|
| Number of Cases | 120. | 117. |
| Interval between menstrual periods | 29.4 days | 27.5 days |
| Duration of period | 5.2 days | 4.5 days |
| Habit (rest, bed, etc.) | .55 | .83 |
| Pain | .61 | 1.36 |
| Duration of pain | 4.7 hours | 13.8 hours |
| No pain | .59 cases or 57.5% | 6 or 5% |

Study of distance of patella from a perpendicular erected .95 cm from instep mark showed the knee to be the point of compensation in balancing on high heels to keep center of gravity over the instep.

Study of the angle of instep, knee, and hip showed same knee bending compensation to shift the center of gravity forward as a result of wearing high vs low heels.

N. Recapitulation of Group Association from A.P. Viewpoint

Of 793 Fall Exams, 757 or 95% had A. P. defects of 1 to 12 degrees.

Of these 379 or 48% were of 4 to 12 degrees (serious).

Of these 574 or 76% had lateral association.

Of these 321 or 42% had hip association.

Of these 469 or 62% had shoulder association.

Of these 214 or 28% had menstrual period disorder association.

Of these 356 or 47% had menstrual pain association.

Of 504 Fall Exams, 489 or 97% had A.P. defects of 1 to 12 degrees.

Of these 254 or 50% were of 4 to 12 degrees (serious).

Of these 377 or 77% had lateral association.

Of these 209 or 43% had hip association.

Of these 303 or 62% had shoulder association.

Of these 132 or 27% had menstrual period disorder association.

Of these 237 or 48% had menstrual pain association.

Of 504 Spring Exams, 445 or 88% had A.P. defects of 1 to 12 degrees.

Of these 158 or 31% were of 4 to 12 degrees (serious).

Of these 341 or 76% had lateral association.

Of these 224 or 50% had hip association.

Of these 287 or 64% had shoulder association.

Of these 98 or 22% had menstrual period disorder association.

Of these 218 or 49% had menstrual pain association.

Number of A.P.'s with the various associations by degrees (504)

| Deg. | A.P. | Lat. | Hips | Sh. | Period | Pain |
|-----------|------|------|------|-----|--------|------|
| 1 Fall | 40 | 28 | 16 | 20 | 11 | 21 |
| 1 Spring | 81 | 57 | 40 | 45 | 20 | 41 |
| 2 Fall | 98 | 68 | 39 | 57 | 28 | 38 |
| 2 Spring | 128 | 95 | 64 | 74 | 26 | 62 |
| 3 Fall | 97 | 78 | 40 | 67 | 26 | 51 |
| 3 Spring | 78 | 69 | 45 | 56 | 15 | 40 |
| 4 Fall | 110 | 90 | 38 | 67 | 32 | 54 |
| 4 Spring | 63 | 46 | 25 | 38 | 15 | 34 |
| 5 Fall | 54 | 39 | 22 | 35 | 12 | 28 |
| 5 Spring | 42 | 37 | 23 | 33 | 7 | 18 |
| 6 Fall | 26 | 19 | 13 | 16 | 7 | 13 |
| 6 Spring | 24 | 17 | 13 | 19 | 7 | 11 |
| 7 Fall | 31 | 28 | 22 | 22 | 8 | 15 |
| 7 Spring | 13 | 9 | 5 | 11 | 3 | 5 |
| 8 Fall | 13 | 12 | 5 | 11 | 3 | 7 |
| 8 Spring | 13 | 8 | 8 | 9 | 4 | 4 |
| 9 Fall | 11 | 8 | 7 | 6 | 2 | 4 |
| 9 Spring | 2 | 2 | 1 | 2 | 0 | 2 |
| 10 Fall | 6 | 4 | 4 | 2 | 2 | 4 |
| 10 Spring | 1 | 1 | 0 | 0 | 1 | 1 |
| 11 Fall | 2 | 2 | 2 | 1 | 1 | 1 |
| 11 Spring | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 Fall | 1 | 1 | 1 | 1 | 0 | 0 |
| 12 Spring | 1 | 1 | 1 | 1 | 1 | 1 |

O. Recapitulation of Group Association from Lateral Viewpoint.

Of 793 Fall Exams, 598 or 75% had Lat. Defects of 1 to 12 degrees

Of these 145 or 18% were of 4 to 12 degrees (serious)

Of these 566 or 94% had A.P. association

Of these 162 or 27% had menstrual period disorder association

Of these 282 or 47% had menstrual pain association

Of 504 Fall Exams, 388 or 77% had Lat. Defects of 1 to 12 degrees

Of these 61 or 12% were of 4 to 12 degrees (serious)

Of these 378 or 97% had A.P. association

Of these 101 or 24% had menstrual period disorder association

Of these 189 or 48% had menstrual pain association

Of 504 Spring Exams, 392 or 78% had Lat Defects of 1 to 12 degrees

Of these 119 or 23% were of 4 to 12 degrees (serious)

Of these 331 or 84% had A.P. association

Of these 84 or 21% had menstrual period disorder association

Of these 175 or 44% had menstrual pain association

Number of Laterals with various associations by degrees (504)

| Deg. | Lat. | A.P. | Menstr. Period | Menstr. Pain |
|----------|------|------|----------------|--------------|
| 1 Fall | 170 | 160 | 49 | 73 |
| 1 Spring | 137 | 121 | 29 | 62 |
| 2 Fall | 130 | 131 | 32 | 72 |
| 2 Spring | 135 | 124 | 32 | 65 |
| 3 Fall | 50 | 50 | 13 | 26 |
| 3 Spring | 76 | 56 | 15 | 32 |
| 4 Fall | 24 | 24 | 4 | 14 |
| 4 Spring | 29 | 20 | 5 | 11 |
| 5 Fall | 9 | 8 | 2 | 4 |
| 5 Spring | 9 | 7 | 2 | 4 |
| 6 Fall | 2 | 2 | 1 | 0 |
| 6 Spring | 2 | 0 | 1 | 1 |
| 7 Fall | 1 | 1 | 0 | 0 |
| 7 Spring | 2 | 2 | 0 | 0 |
| 8 Fall | 0 | 0 | 0 | 0 |
| 8 Spring | 1 | 1 | 0 | 0 |
| 9 Fall | 2 | 2 | 0 | 0 |
| 9 Spring | 1 | 0 | 0 | 0 |

P. Sport Correlations. 513 Cases. Fall vs Spring 1928-29

| | Better | | Same | | Worse | |
|------------|--------|------|------|------|-------|------|
| | A.P. | Lat. | A.P. | Lat. | A.P. | Lat. |
| Archery | 34 | 15 | 10 | 15 | 12 | 21 |
| Baseball | 23 | 16 | 6 | 15 | 23 | 19 |
| Basketball | 46 | 21 | 16 | 27 | 25 | 36 |
| Bowling | 45 | 18 | 29 | 27 | 22 | 40 |
| Canoeing | 10 | 6 | 4 | 6 | 5 | 6 |
| Corrective | 100 | 69 | 24 | 37 | 23 | 35 |
| Dance | 70 | 26 | 16 | 37 | 34 | 45 |
| Folk Dance | 21 | 8 | 19 | 15 | 19 | 22 |
| Golf | 28 | 10 | 14 | 20 | 18 | 19 |
| Hockey | 31 | 18 | 13 | 20 | 20 | 26 |
| Plastics | 16 | 10 | 6 | 10 | 12 | 16 |
| Riding | 20 | 9 | 13 | 14 | 13 | 24 |
| Swimming | 253 | 126 | 92 | 123 | 124 | 168 |
| Tennis | 107 | 51 | 40 | 51 | 55 | 80 |
| Volleyball | 36 | 19 | 12 | 13 | 16 | 20 |

Symmetrical sports grouping: archery, canoeing, corrective, dance, folk dance, plastics, and volleyball, showed 500 A.P.'s and 450 Lat.

| | Better | | Same | | Worse | |
|--|--------|------|------|------|-------|------|
| | A.P. | Lat. | A.P. | Lat. | A.P. | Lat. |
| | 277 | 153 | 101 | 133 | 121 | 165 |
| | 56% | 36% | 20% | 29% | 24% | 35% |

Asymmetrical sports grouping: baseball, basketball, bowling, golf, hockey, riding, swimming and tennis, showed 1056 A.P.'s and 978 Lat.

| | Better | | Same | | Worse | |
|--|--------|------|------|------|-------|------|
| | A.P. | Lat. | A.P. | Lat. | A.P. | Lat. |
| | 533 | 269 | 223 | 297 | 300 | 412 |
| | 50% | 27% | 22% | 30% | 28% | 30% |

VIII. Summary of Tables with Comments

Tables A, B and C. Posture Grade Comparisons

There is a definite rise in the percentage of students entering with A postures: 2% in 1920, 17% in 1926, 21% in 1928 and 29% in 1929. The number of B grades has remained substantially the same. The number of C-D grades has substantially decreased from 70% in 1920 to 42% in 1929.

Probably two factors account for this change; the increased amount of physical activity and postural emphasis propaganda, both parts of the broader physical education programs which have become increasingly widespread the last few years, and the change in styles with an increase in the number of girls of the athletic type who refuse to be physically hampered by extremes in style. The A-B groups are still not of a sufficiently large percentage to permit of "watchful waiting" in view of the seriousness of postural defects and steps should be taken to increase this percentage more rapidly.

Tables D and E. Years of Physical Education Prior to University.

In the 1920-26 comparison statistics were not listed by percentage; the statement shows an increase in the number of students entering with four or more years physical education and a definite decrease in number entering with zero and one year. There is therefore no basis for comparison with 1928 but these 1928 percentages show that almost half the entering students (44%) have had four or more years of physical education prior to entering the university—surely an excellent showing for the increased popularity and installation of physical education in the secondary schools over the Middle West.

The second part of table E shows the average number of years of physical education of the students having the various posture grades. The A-B grade group had 3.25 years previous physical education as compared with 2.95 years of the C-D group.

Tables F, G and H. Detail Study of Defects.

These represent a detailed study of the precise defects considered in both the antero-posterior and lateral deviations from the normal.

- From 62% to 91% have increased cervical curvature.
- From 38% to 77% have increased dorsal curvature.
- From 24% to 50% have increased lumbar curvature.
- From 50% to 77% have increased ptosis.
- From 29% to 32% have body weight line displacement.
- From 49% to 57% have lateral deviation.
- From 38% to 45% have lateral rotation.
- From 41% to 45% have asymmetrical hips.
- From 48% to 64% have asymmetrical shoulders.

The figures are startlingly high and are conclusive statistical evidence to support the statements of corrective specialists against

even the most skeptical. With 50% of these people having as a background 3.25 years of physical education it is shown that the recent trend of physical education toward sport types of activity is not alone adequate to postural needs.

Table I. Contrast of Fall and Spring Examinations—504 Cases.

All these figures are higher than in the group discussed just above. Again the startlingly high percentage cases with defects strikes one, and the figures show that the 2 degree and 3 degree cases are numerous enough to warrant prompt consideration of remedial measures.

Notice that as a whole the antero-posterior cases improved during the freshman year. Only 18% of these girls took corrective work, but practically 100% had required physical education of some sort, mostly all sport activities without postural exercises or emphasis. However, in contrast, note that the lateral cases did not improve to correspond; in fact, did not improve at all, while their correlaries, asymmetrical hips and spinal rotations increased in number. Once the lateral curve is started it is harder to remedy than the average antero-posterior defect, and its effect is normally more far reaching with concomitant organic and pathological complications. However, the antero-posterior defects are of great importance not only because they represent a segment of the body whole that is "compensatorily out of place" (as will be pointed out later on) but because, to quote Lowman, Colestock and Cooper, the California authorities on public school correctives, of its relation to eye strain:

"The assumption and change of habitual body attitudes takes place because of the action of the posturing mechanism in the head and neck, which involves spinal nerve centers, eyes, and inner ear mechanism or labyrinth. The maintenance of posture against heavy odds with segments slumping out of position naturally involves more work for this intricately co-ordinate mechanism. This results in more neural outgo than exists when alignment and muscle tone are normal. All activities in which fixed attention is necessary, require the head to be held fixed, in order that the eyes may function to best advantage. Consequently the eye position is important."

Table J. Individual Case Study.

In compiling other tables the columns of each separate kind of defect were totaled. On the average it was safe to make correlations by comparing these totals: e. g., to say that improvement in antero-posterior defects took place if the spring totals were lower than the fall ones. The author felt that a study of individual cases was desirable to check the accuracy of this method of averaging columns. Table J. represents a charting of the 504 cases according to what happened in each individual case and it checks up within a few degrees the same as the average method. Interpreting; of the girls who had 1 degree defects in the fall, 8 antero-posteriors and 43 laterals improved, 16 antero-posteriors and 67 laterals remained the

same and 20 antero-posteriors and 69 laterals got worse. A score of 12 was possible in antero-posterior while only 9 was possible in lateral, hence the chart showing degrees runs only to 9 on the laterals.

Note that while 54% antero-posteriors improved, only 33% laterals improved—supporting observation on table I. Summarized as a whole Table J shows:

| | |
|---------------------------|-----------------------|
| Of the antero-posteriors— | 54% improved |
| | 19% remained the same |
| | 27% got worse |
| Of the laterals— | 33% improved |
| | 30% same |
| | 37% worse |

Table K. Study of 1,300 Cases from All Grades in the University.

This was a preliminary survey made to provide some statistical support for the observation of the instructors working with these girls. It suggested the more elaborate and accurate study of this thesis. This represents a cross section of the girls in the entire university and without doubt is typical of most college girls and of girls of college age; when 68% of these girls have antero-posterior defects, 52% spinal curvature and 52% defective feet surely it is evident that the corrective problem belongs in the secondary schools as a preventive measure and where damage can be remedied more easily due to both physical and mental plasticity. To quote Lowman again,

"It can readily be appreciated that the really appropriate place for a corrective program is in the elementary schools. Its elaboration here would mean a far greater accomplishment and take a load from future high school and college departments. In fact, properly handled, there would be many less weakened and handicapped students in high school and still fewer in college, if a sensible and consistent program of physiological more than athletic value were established. School administrators will have much to answer for if they persistently close their eyes to the fact that a majority of their charges have deficiencies, which, if uncorrected, will lead to unfitness in later life.

"There are marked physiological and anatomical advantages in beginning remedial work during early childhood. The interest is much keener, the competitive spirit in athletics does not exist to so marked a degree, and possible gains and improvements are obtained more quickly. The tax payers' money should be spent on more and better gymnasium equipment for the elementary schools, and better trained physical directors, and not so much for the benefit of the physically fit in high schools."

In an interesting and useful little "Handbook of Suggestions on Health Education," the Board of Education of Great Britain states that,

"The Health and well being of the Child is the primary foundation of its education and...the basis upon which all mental education must necessarily be founded. The school should afford every opportunity for the healthy development of their bodies and should teach the deeper motives of healthy living not only for their own needs but for what one generation owes another."

Thus the duty of the school system is conceived in England: in America, where the State early conceived it its duty to educate the child to best fulfil the needs of the State, it is high time we added to our conception of "needs" this great problem of the physical defects prevalent among our growing children.

Table L. Correlation of Menstrual with Antero-posterior Defects

The menstrual cycle is normally a twenty-eight day one consisting of several functional divisions divided approximately as follows: five days of congestion, five days of flow, three days of repair, and fifteen days of rest. It is essential that the rest period be sufficiently long for the new uterine membrane to grow strong. Also the cycle involves not only these uterine changes but changes in the ovaries which take time and which at regular intervals affect the blood chemistry and start the uterine cycle of which menstruation is the visible phenomenon.

To have the menstrual period shortened appreciably not only disturbs the chemical cycle but makes a weakened uterine membrane which, with the first shock, strain, or increase of abdominal pressure, permits the blood to burst through into continually and progressively shortening menstrual intervals and causes general systemic weakness and lowered resistance.

Small wonder that many girls and women consider this natural nidation process as a "sickness" and as necessarily painful (though it is neither in the normal case). When the two studies shown give from 28% to 35% abnormal period, from 45% to 47% painful period, and when 6% are confined to bed from one to three days, of course girls think pain a normal menstrual association. Another study made by the author the past year in a senior high school showed approximately 35% of the girls with a history of disordered menstrual periods and many cases of painful menstruation were readily brought under control or entirely eliminated by simple remedial exercises done without extra equipment. Many such cases can be prevented by proper instruction in the high schools.

Table M. Correlation of Low vs. High Heels with Pelvic Tilt and Knee Compensation. (Gilman and Mellody).

This study is better understood taken with its adjacent links in the chain referred to in the introduction to this thesis. As would be expected, compensation for the shift from the normal position of any one segment is made in other segments, and in the case of high heels the entire center of gravity is shifted forward with a bending of the knees to take up the heel lift. This shift increases pelvic obliquity with consequent menstrual disturbance—95% of the high heel cases having dysmenorrhea as compared to 42% of the low heel cases (shows heels to be only one of the many causes).

Tables N and O. Correlations from Anterior-posterior and Lateral Angles.

These individual case correlations are an entirely new study as far as the author knows. In the tables shown previously there are obvious correlations—that is, if 68% have antero-posterior defects and 52% have lateral defects, obviously some of the antero-posterior girls are included in the lateral group. However, some of the 32% girls in normal antero-posterior might also have been included in the laterals. To determine just what was the correlation it was necessary to tabulate each individual case through. The defects were grouped and the details within each group totalled so as to give a group score; e.g. a girl with one degree head, two degree dorsal and one degree lumbar received a score of four degrees.

Viewed from the antero-posterior standpoint, out of 793 cases examined in the fall, 95% (757) had antero-posterior defects of some kind and of these 48% (379) were of some serious import. Now, of these 757 girls with antero-posterior defects, 76% had lateral association, 42% a hip (asymmetrical) association, 62% a shoulder association, 28% a serious menstrual period irregularity (under 22 days or over 32 days), and 47% had a menstrual pain association.

This lateral association found with antero-posterior makes the latter so much the more serious, for the lateral defects are more far reaching in organic pressures and distortions than the antero-posterior. It will be noticed that the higher the degree of antero-posterior defect the higher the percentage of lateral association; evidently the antero-posterior tends to be one of the causes of the lateral, and the worse the former the more chance of having the lateral association with it, though a 60% association occurs in only a one degree antero-posterior. Figuring it out from the table the exact percentage association with each degree defect (antero-posterior basis) we have with

| | | | | | | | | | |
|----|--------|------|--------|-------|----|---|------|---------|--------------|
| 1 | degree | A.P. | defect | there | is | a | 60% | lateral | association. |
| 2 | " | " | " | " | is | a | 74% | " | " |
| 3 | " | " | " | " | is | a | 72% | " | " |
| 4 | " | " | " | " | is | a | 74% | " | " |
| 5 | " | " | " | " | is | a | 62% | " | " |
| 6 | " | " | " | " | is | a | 83% | " | " |
| 7 | " | " | " | " | is | a | 85% | " | " |
| 8 | " | " | " | " | is | a | 100% | " | " |
| 9 | " | " | " | " | is | a | 100% | " | " |
| 10 | " | " | " | " | is | a | 100% | " | " |
| 11 | " | " | " | " | is | a | 100% | " | " |
| 12 | " | " | " | " | is | a | 100% | " | " |

Viewed from the lateral standpoint, the percentage association was greater, as one would expect. A lateral curvature is almost bound to

produce a fatigue posture and accompanying slump in the antero-posterior aspects. Of course, not as many girls had lateral curvature, but there was a sufficiently large percentage to indicate an alarming situation nevertheless. Of 793 girls examined in the fall of 1928-29, 75% (598) had a lateral curvature of from one to nine degrees, and of these 145 or 18% were of really serious import. Remember that a curve is approximately three times greater internally than is apparent externally and visualize the cramped nerve trunks and blood vessels, the strain and stress on the growing organs when 18% of our girls have a major spinal curvature. To continue with association—of these 598 cases with lateral curvature 94% have antero-posterior association, 27% a menstrual period irregularity of major degree, and 47% a menstrual pain association.

Table P. Correlations of Sports with Physical Defects.

In this study the figures represent the total number of freshmen who took part in the sports listed, whose record of sports taken could be obtained, and who had both a fall and a spring examination so as to make comparison possible. Of course, a great many more girls took part in each sport who didn't meet these conditions. The list presents duplication in individual cases because most of the girls studied took more than one sport. As a comparison of better-worse though, it is fairly accurate as to average sport effect, though the particular grouping of the several sports each girl selected obviously did affect the results. The diversity of available selections made it impossible to correlate by various groupings. However, in checking totals for each sport, it was very noticeable that within each individual girl's case certain combinations of sports selected led to improvement and certain other combinations repeatedly led to a worse condition. In the combinations and single sports that led to such an obviously noticeable improvement or lack of improvement were,

1. Archery practically always led to a better A.P. condition.
2. Swimming " " " " " worse Lat. "
3. Arch. & Corrective " " " " better Lat. "
4. Swimming & Bowling " " " " worse Lat. "
5. Arch. & Volleyball " " " " better Lat. "
6. Swimming put with Arch. & V.B. " worse Lat. "

At Wisconsin the side stroke has been particularly emphasized and its asymmetrical nature readily explains the decidedly greater number of cases which developed worse lateral condition. Many of these swimming cases took it all three sport seasons and the correlation in swimming vs defects is probably the most accurate on the list.

Notice that corrective is the only activity listed which showed more lateral cases improved than became worse, and it practically

doubled the number—no mere coincidence! In items five and six, notice that the addition of swimming spoiled the good effect of the archery-volleyball combination.

To compare what actually happened and what one would naturally expect from the nature of the sport the table shows a grouping of symmetrical and asymmetrical activities. This grouping is arbitrary and may be questioned. At Wisconsin swimming is primarily side stroke with average swimmers and in classes for beginners and intermediates, and is naturally done on one side for the most part; canoeing is taught on both sides, dancing surely is taught as a symmetrical activity though a girl with a curve would naturally favor the curve and could easily make it largely asymmetrical as results seem to indicate was the case.

In this grouping it seems obvious that something should be done to counterbalance the one sided nature of our major and most popular sports. Many could be taught from both sides, symmetrical strokes in swimming could be insisted upon, exercises with postural emphasis could precede the sport activity and be designed to counterbalance the sport in each period.

Most sports of both classes improved antero-posterior defects, except swimming where the percentage of worse antero-posteriors was higher than in other sports, and this improvement was no doubt due to the alert attitude cultivated, to strength and tonus acquired. The asymmetrical group showed a great preponderance of worse lateral cases, while in the symmetrical groups of activities the number of better and worse cases was almost the same.

IX. Conclusions and Recommendations

1. *Remedial and corrective work are necessary.*
Sport emphasis in the physical education program has excellent moral, recreative, social, and carry-over values and should be continued, but in spite of the increased amount of such physical education the growing number of physical defects shows this program to be inadequate. Many of our best athletes have poor postures at best, and in after life the pliability and strength from sports will decline and the habit formed lead to a structural fixation in the poor posture.
2. *Physical Examination is essential to diagnosis.*
Heart and lung examination are O.K. and necessary for sports; a spinal examination and menstrual history study are important to growing young womanhood.
3. *Asymmetrical sport emphasis tends to create lateral curves.*
Our present tendency in sports popularizes asymmetrical activities which have a deleterious effect upon lateral defects of the spine and frequently cause them. Such asymmetrical emphasis

should be eliminated as much as possible by teaching method and surely should be counterbalanced by exercises preceding the sport period which would tend toward correction. It would be well to establish balanced groups of both the symmetrical and asymmetrical types of sports which the girls could elect instead of being able to choose any single sport which may form a disastrous combination.

4. *The problem of correctives belongs in the secondary school.*
The high percentage of antero-posterior, lateral and menstrual defectives entering college shows the problem to be an important secondary school one. The examination and preventive work should start there, if not in the elementary grades where Bancroft's study shows the situation really arises (after second or third grade).
5. *We must renew and increase postural emphasis in education.*
The high percentage correlation between the various types of defects shows statistically the inter-relationship of each of the body segments and organs and that this relationship must be along accepted lines of good posture as herein outlined if proper organic functioning is to be expected. Therefore renew and increase postural emphasis and muscle sense training. Put it in as an introductory part of every sport class.
6. *The greater the degree of defect in any one aspect or group, the greater the percentage of association defects.*
7. *Special classes for individual needs are necessary.*
Menstrual cases can largely be prevented in the secondary schools. Proper hygiene instruction and practice under competent supervision, by directors especially trained in corrective methods, should be given in the secondary schools. This type of work can be done both in groups, where people with similar defects are brought together, and with individual case work handled in small units with student assistants. Those girls presenting medical excuses can be grouped into such special classes. The author actually did this in a senior high, and, for obvious reasons, called it a health class. It was made up not only of those girls who had had an attack of "don't-want-to-undress-itis", but also of those students who were unable to participate in any sports or active exercises, and who needed supervised, regular rest and relaxation. They were heart cases, post-operatives, nervous and anemic and similar cases needing special attention. They were taught to achieve muscle sense and control through simple, non-taxing muscle contractions without active movement, and done while lying supine or prone.
8. *There is a definite progression of difficulties.*
Each of the types of defects discussed is soon to cause compen-

satory defects in other segments with a constantly increasing progression from minor to major degree. The common round shoulder and forward head lead to ptosis, and that causes the resultant of forces holding the uterus to be changed; the weight of viscera is dropped down onto pelvic organs, and the menstrual difficulties arise—not only painful to the individual, but a great economic loss to her and to society, not to mention the difficulties of carrying and delivering in pregnancy. Lateral associations occur in 76% of the cases and actual displacement of organs occurs, followed later in life by improper functioning and pathological conditions not to mention nervous irritability and restlessness in youth.

9. *Styles and fads which affect posture must be combatted.*

This can be done by the cultivation of a sense of independence from them where matters of health and vitality and future happiness are concerned. Groups can set their own styles if well led and influenced and taught the "why" of their deviation from what "the rest" of the town is wearing. Teach that clothes, and shoes especially, should fit the body and not vice versa. The tightly laced corset was once thought to be an essential; any clothing that constricts and distorts, especially shoes, can be made obsolete by an educated public opinion, and the place to start is in that pliable creature, the high school girl.

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The Distance Traversed by a Basketball Player

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IN the course of a series of studies comparing the different competitive sports with respect to a number of factors, the following information was obtained pertinent to the distance traveled by a player during a basketball game. The measurement was made possible through the development of an electrical pursuit apparatus which provided for numerical registration of unit distances traveled. This piece of apparatus consisted of a tin base, on which was etched a basketball court laid off to scale, wired in series with a $4\frac{1}{2}$ volt dry cell battery, an electric impulse counter, and a small brass tracing wheel, four inches in diameter. Strips of insulating tape were placed at half inch intervals on the circumference of the wheel so that rolling it on the tin floor made and broke a circuit for every half inch covered. An impulse counter was used to record these contacts, each one of which, with our calibration, represented a distance of two feet on the 94x50 ft. playing floor. To determine the distance which any player traveled during the course of a game, the experimenter would follow his excursions back and forth and across the floor with the pursuit wheel. The apparatus seems to measure very accurately. Having different observers trace the same man made no noticeable difference in the activity recorded. The average distance traversed by any one man during the ten four minute periods of a number of basketball scrimmages was in every case more than eight times its probable error.

Student estimates of distance traversed. Prior to the actual measurement,¹ 135 men estimated the distance they thought a player might cover during the game. Twenty-nine of these men were experienced in the sport, being freshman or varsity material or having played on high school teams. Table 1 represents the range of these estimates. Apparently having played basketball has little to do with one's ability

¹The game observed was between DePauw University and Miami University played at Greencastle, Indiana. The DePauw floor guard was followed for the entire game.

TABLE 1. ESTIMATES MADE AS TO THE DISTANCE TRAVELED BY A BASKETBALL PLAYER DURING THE COURSE OF ONE GAME

| Estimates in feet | Number of such estimates (all men) | Number of such estimates (players) |
|----------------------|---------------------------------------|---------------------------------------|
| 1000- 4999 | 10 | 2 |
| 5000- 8999 | 18 | 3 |
| 9000-12999 | 15 | 4 |
| 13000-16999 | 16 | 4 |
| 17000-20999 | 17 | 4 |
| 21000-24999 | 22 | 2 |
| 25000-28999 | 15 | 6 |
| 29000-32999 | 5 | 2 |
| 33000-36999 | 2 | 1 |
| 37000-40999 | 9 | 0 |
| 41000 up to 100000 | 6 | 1 |
| | 135 | 29 |

to estimate the amount of this type of activity involved. The conjectures were consistently too large. The actual distance covered by the player was 12,365 feet. The median estimate for all men, as well as for the basketball players, was 18,000 feet, over a mile too far. The range of estimates was from one-fifth of a mile to twenty miles.

Comparison of activity at different periods. A record of the distance traversed was noted every two minutes, which made possible a comparison for different periods of play. Table II represents the number of feet traversed by the player during each four minutes of play. The difference in activity between the first and last halves of

TABLE II. ACTIVITY OF PLAYER FOR EACH FOUR MINUTE PERIOD

| Period | Distance | Period | Distance |
|------------------|-----------|-------------------|-----------|
| 0- 4 min. | 1561 feet | 21-24 min. | 1196 feet |
| 5- 8 min. | 1283 feet | 25-28 min. | 1004 feet |
| 9-12 min. | 1176 feet | 29-32 min. | 1429 feet |
| 13-16 min. | 1324 feet | 33-36 min. | 1320 feet |
| 17-20 min. | 984 feet | 37-40 min. | 1088 feet |
| First half | 6328 feet | Second half | 6037 feet |

the game is slight. There was but slight let up in distance traversed. This factor is further illustrated by a comparison of the ground covered during the first and last ten minutes of the game, namely 3,206 and 3,081 feet respectively. The average distance through which our player moved during each of the two minute periods in the first half was 611 feet, and for the last half 605 feet. The mean distance covered for all two minute periods was 608 feet with an average devia-

tion of 87.4. Table III represents a frequency distribution of the distances travelled for each two minute period during the game. Most of the measurements were in the neighborhood of six hundred feet.

TABLE III. FREQUENCY TABULATION OF DISTANCE COVERED PER TWO MINUTE PERIOD

| Distance | Frequency | Distance | Frequency |
|---------------|-----------|---------------|-----------|
| 300-349 | 1 | 550-599 | 3 |
| 350-399 | 1 | 600-649 | 3 |
| 400-449 | 1 | 650-699 | 7 |
| 450-499 | 0 | 700-749 | 2 |
| 500-549 | 1 | 750-799 | 1 |

Distance traversed on offense and defense. Records were kept of each time the ball changed hands, making possible a comparison of the activity involved with the use of offensive or defensive tactics. With the particular style of play employed,² the ball changed hands 92 times during the forty minutes of play, or an average of once every 26.1 seconds. The total distance traversed on offense was 7,808 feet and on defense 4,554 feet. The mean distance covered for each of the 46 offensive periods was 169.9 feet, and for the defensive periods 99.0 feet. Table IV represents the distribution of distances

TABLE IV. DISTRIBUTION OF DISTANCES COVERED PER PERIOD OF OFFENSIVE AND DEFENSIVE PLAY

| Distance | Offense | Defense | Distance | Offense | Defense |
|--------------|---------|---------|--------------|---------|---------|
| 0- 50 feet | 9 | 8 | 201-250 feet | 3 | 5 |
| 51-100 feet | 11 | 20 | 251-300 feet | 4 | 0 |
| 101-150 feet | 5 | 9 | 301-350 feet | 2 | 0 |
| 151-200 feet | 7 | 4 | 351-400 feet | 5 | 0 |

traversed for the offensive and defensive periods. This extreme range is much greater for the offensive type of play although the teams were very evenly matched.

In future studies, using a modification of the same apparatus, the writers plan to report upon the activity involved in the different team positions for both football and basketball. These results will be correlated with such variables as loss in body weight, type of game played, speed of player, etc.

Summary. In the course of investigations into the amount of activity involved in the different sports, an apparatus was developed

² Both DePauw and Miami used three men ahead of the ball on offense, the forwards in their corners and the center under the basket, with the guards feeding the ball in for block and pivot plays. Each team used the man to man defense, which necessitates more activity on the part of the defensive player than does the zone defense. DePauw had possession of the ball a large part of the game, electing to play a waiting game in an attempt to work the ball in close for lay-in shots. Miami attempted a number of long shots, almost invariably losing possession of the ball if the basket was missed. This may partially explain the fact that our subject traveled much farther on offense than on defense.

making it possible to measure distance traversed. Using this apparatus to follow the excursions of a basketball player for one game the following facts were noted:

- a. Student estimates of the distance traversed were consistently too large.
- b. Activity did not vary significantly from one period of the game to another.
- c. Almost twice as much distance was covered on offense as on defense, and
- d. The total distance traversed by the floor guard followed was 2.34 miles.

A Study of Play Facilities of Seventy-One Elementary Schools in Seventy-One Cities of Over 20,000 Population*

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Introduction

Objective of the Study:—Standards have been set for playgrounds by various authorities¹ relative to the area, and recommendations have been made as to surfacing of playgrounds. It is the purpose of this study to ascertain the extent to which these standards are met and recommendations followed in these schools. It is also the purpose of this study to ascertain if possible whether or not population, both city and school, and economic status have any relation to the size of these playgrounds or are a contributing factor as to whether or not these schools have gymnasiums.

Source of Material:—The data of this study were gathered by the field squads of the American Child Health Association School Health Study, and made accessible to the writer by the courtesy of the Association.

Reliability, Objectivity and Validity of Dates:—Areas were obtained by actual measurement by the physical education members of the field squads and classifications of surface were made by them from standards set before squads went into the field.

Limitations of the Data:—We realize that conclusions drawn from these data must be limited to the number of schools being considered. However, it is not our purpose to set up empirical conclusions relative to all school systems and schools. Therefore any conclusions drawn apply to the schools in question but may be considered as an indication of the trend of schools throughout the country owing to the method used in obtaining the sampling of schools which was made for the study. These data apply only to cities of over 20,000 population and only to elementary schools.

* The writer wishes to thank George T. Palmer, Dr. P. H., Director of the Division of Research of the American Child Health Association, for permission to use these data, which he as technician and physical education member of the western squad of the school health study assisted in collecting.

¹ (1) "Standards for Elementary Schools," Strayer and Engelhardt, page 10. (2) "Preparation of School Grounds for Playfields and Athletic Events," P. E. Series No. 1, Bureau of Education, 1923, page 1. (3) "Play Areas, Their Design and Equipment," P. R. A. of A., Chapter 1, page 4.

Method of Handling Data:—Where the extent of these data made the use of statistical procedure valid, it is followed. Otherwise tables are shown and logical conclusions which we deem warranted are drawn.

TABLE 1.
Showing Distribution of Per Pupil Area of Playgrounds for Schools With and Without
Gymnasiums as to Region of the Country

| Per Pupil Area of Playground sq. ft. | Southern no gym | | Western no gym | | Eastern no gym | | Sub Totals no gym | | Totals |
|--|-----------------------|-----|----------------------|-----|----------------------|-----|-------------------------|-----|--------|
| | gym | gym | gym | gym | gym | gym | gym | gym | |
| 1225 | | 1 | | | | | 1 | | 1 |
| 550 | | | | | 1 | | | | 1 |
| 525 | | | | | | | 1 | | |
| 500 | | | | | | | | | |
| 475 | | | | | | | | | |
| 450 | | | | | | | | | |
| 425 | | | | | | | | | |
| 400 | | | | | 1 | | 1 | | 1 |
| 375 | | | | 1 | | | 1 | | 1 |
| 350 | | | | | | | | | |
| 325 | | | | | | | | | |
| 300 | | | | 1 | | | 1 | 1 | 2 |
| 275 | | | 1 | | | | 1 | | 1 |
| 250 | | | | | | | | | |
| 225 | 1 | | 1 | | | | 2 | | 2 |
| 200 | | 2 | 1 | 1 | | 1 | 1 | 4 | 5 |
| 175 | 1 | 1 | | | | | 1 | 2 | 3 |
| 150 | | 2 | | 1 | 1 | 1 | 1 | 4 | 5 |
| 125 | | 1 | | 1 | | | | 2 | 2 |
| 100 | 1 | | 2 | 3 | 1 | 2 | 4 | 5 | 9 |
| 75 | 1 | 1 | 3 | 1 | | 3 | 4 | 5 | 9 |
| 50 | | 3 | 1 | 1 | 1 | 3 | 2 | 7 | 9 |
| 25 | | 7 | 1 | | 2 | 9 | 3 | 16 | 19 |
| 0 | | | 1 | | | | 1 | | 1 |

Gymnasiums

Of the schools visited 23 had gymnasiums and 48 did not have this facility. They were distributed according to region as follows:

| | No Gymnasiums | Gymnasiums |
|----------|---------------|------------|
| Eastern | 19 | 7 |
| Western | 11 | 12 |
| Southern | 18 | 4 |
| Total | 48 | 23 |

The average population of the cities in which the schools visited *had* gymnasiums was 128,250. The average population of the cities in which schools visited *did not have* gymnasiums was 143,770. This difference in population divided by the standard deviation of the difference, which we are calling significance of the difference, is .41, which is of no significance in this group of cities.

The average number of pupils in the schools having gymnasiums was 780. The average number of pupils in the schools visited not having gymnasiums was 613. The significance of the difference for school population was 2.5. This is quite significant and shows that in the schools studied the larger schools were more likely to have gymnasiums than the smaller schools.

Of the schools studied having gymnasiums the average economic status on the basis of 1 to 5 was 3.1 while that of the schools not having gymnasiums was 2.9. The significance of the difference was

.59, showing that there was no significant difference in the economic status of those schools having gymnasiums and those without.

A comparison of the per pupil area of the playgrounds of the seventy-one schools studied with and without gymnasiums shows that the average per pupil area of the schools with gymnasiums was 123.9 sq. ft. For schools without gymnasiums the average per pupil area was 126.7. The significance of the difference is .08 which is negligible.

Table 1 shows the distribution of schools with and without gymnasiums as to region and per pupil area. Inspection of this table shows that there are 4 schools in the southern group with gymnasiums and 6 of the eastern schools with gymnasiums. On the other hand 12 of the western schools have this facility.

CONCLUSIONS

1. From these data it would seem that for population above 20,000 the size of population is not a factor in determining whether a school has a gymnasium. On the other hand school population is quite definitely a factor.
2. That Boards of Education are impartial as to the economic status of districts in which school gymnasiums are provided and that educational and other factors are more likely considered.
3. That there is no relation between the per pupil play area and the presence of a gymnasium in a school.
4. Inspection of Table 1 would seem to indicate that region and climate are important factors in determining which schools have gymnasiums. The data are not sufficient to statistically substantiate this claim.

Playgrounds

Of the schools visited in the study there was only one of the seventy-one schools which did not have a playground. Table 1 shows that this school was provided with a gymnasium. This may or may not be significant. The extent of the data is not sufficient to substantiate the conclusion that it is significant.

In sixty-five of the schools surveyed the play areas were a part of the school grounds. In the other five cases the play areas were adjacent and easily accessible. One school did not have a playground.

Strayer and Engelhart³ give as standards for playground area:

- 10,000 sq. ft. for less than 100 pupils
- 4,000 sq. ft. for next 100 pupils
- 4,000 sq. ft. for each additional 100

The Playground and Recreation Association of America³ recommends 100 sq. ft. per pupil. The median for all elementary schools studied was 125.3 sq. ft. per pupil.

Table 1 shows the distribution of the schools according to region and per pupil area.

³ "Standards for Elementary Schools," page 10.

³ "Play Areas, Their Design and Equipment."

Strayer and Engelhart⁴ recommend a minimum of four acres as a standard for playfields.

The Playground and Recreation Association of America⁵ says, "Under normal conditions three or four acres is a satisfactory size for the children's playground although a larger area is preferable."

Table 2 shows the distribution of playgrounds according to region and acreage.

TABLE 2

| Acres | 0 | ¼ | ½ | ¾ | 1 | 1¼ | 1½ | 1¾ | 2 | 2¼ | 2½ | 2¾ | 3 | 3¼ | 3½ | 3¾ | 4 | 4¼ | 4½ | 4¾ | 5 | 7 | 8¼ | 11½ |
|----------|---|----|----|---|---|----|----|----|---|----|----|----|---|----|----|----|---|----|----|----|---|---|----|-----|
| Southern | | 3 | 5 | 4 | 1 | | 3 | | 1 | | | 3 | | | | | 1 | | | | | | | 1 |
| Western | 1 | | 1 | 3 | 4 | 1 | 1 | | 3 | 1 | 2 | | 1 | 1 | | | 2 | | | 1 | | | | 1 |
| Eastern | | 11 | 6 | 1 | 2 | 1 | 1 | 1 | | | | | 1 | | | | | | | | | 1 | 1 | |
| Total | 1 | 14 | 12 | 8 | 7 | 2 | 5 | 1 | 4 | 1 | 2 | 3 | 2 | 1 | | | 3 | | | 1 | 1 | 1 | 1 | 1 |

The data when treated statistically showed a correlation between population and per pupil area of $r=.08$ which would indicate that in the population group above 20,000, size of city has no influence on the size of playgrounds. The correlation between school population and per pupil area shows $r=.06$ which is also negligible.⁶

The correlation of economic status and per pupil area shows an r of .2011. Though this is low it shows a slight tendency for schools of the better economic class to have larger play areas per pupil.

The data were divided by section of the country for per pupil area and economic status and the r 's computed for the various sections are: Eastern .19, Western .08, Southern .31. This would seem to indicate that the tendency for schools of the better economic class to have larger play areas per pupil does not exist in the western section, a slight tendency exists in the East, and a slightly higher tendency is found in the South.

CONCLUSIONS

1. That although the median per pupil area for all schools is 125.3 sq. ft. a study of Table 1 and Table 2 indicates that the schools studied are not meeting standards as to per pupil area and that they have not sufficient play area for the play needs of the children according to the standards as set by leading authorities.
2. That there is no correlation between city and school population and per pupil area.
3. That there is a slight tendency for schools of the better economic status to have larger play areas per pupil. That this tendency is negligible in the western section, slight in the eastern section and slightly higher in the southern section. This applies to the seventy-one schools studied only.

⁴ "Standards for Elementary Schools."

⁵ "Play Areas, Their Design and Equipment," page 4.

⁶ Throughout this paper conclusions have been confined to the data in question. Though the number of schools studied is not sufficient to represent the elementary schools of the United States they are sufficient to indicate trends. For these reasons the P.E. or r has been omitted.

Surfacing

The Playground and Recreation Association of America¹ gives various recommendations as to surfacing of playgrounds.

Turf and grass are recommended as the best where play areas are sufficiently large enough to insure the grass not being trampled too much. Next in order come sandy loam clay and sand. These are the same recommendations made by Jay B. Nash in his book².

The following tables 3, 4, 5, and 6 indicate the surfacing found on the playgrounds of the seventy-one schools studied.

TABLE 3
Percentage Distribution of Surfacing Found on Eastern School Playgrounds

| Type | 100% | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 |
|-------------------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| Gravel | 8 | | 3 | | | | | 1 | 1 | | 1 | | | | 1 | | 1 | 1 | 1 | |
| Clay | 1 | | | | | | | | 2 | | | | | | | | | | | |
| Sand | | | | | | | | | 1 | | | | | | | | | | | |
| Grass | | | | 1 | 1 | | | | | | | | 1 | 1 | 1 | 1 | | | 2 | |
| Surface | 2 | | | | | | 1 | | | | 1 | | 1 | | | | | | | 1 |
| Cinders | 2 | | | | | | | | | | | | | | | | | | | |
| Unimproved Street | | | | | | | | | | | | | | | | | | | | 1 |

TABLE 4
Percentage Distribution of Surfacing Found on Western School Playgrounds

| Types | 100% | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 |
|-------------------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| Gravel | | | 2 | | 1 | 2 | | 1 | 1 | | 1 | | | | | | | | | |
| Clay | 2 | | | | | 1 | | | | | 2 | | | | | | | | 1 | |
| Sand | 2 | 1 | | | 1 | | | | | | | | | | | | | | | 1 |
| Grass | 1 | | | | 1 | | | | | | | 2 | 2 | 1 | | | 1 | 1 | 2 | |
| Surfaced | 1 | | | | | | | | | | | | | | | 1 | 3 | 1 | 6 | 3 |
| Crushed Stone | | | | | | | | | | | | | 1 | | | | | | | |
| Sand and clay | | | | | 1 | | | | | | | | | | | | | | | |
| Unimproved Street | | | | | | | | | | | | | | | | | | | | 1 |

TABLE 5
Percentage Distribution of Surfacing Found on Southern School Playgrounds

| Types | 100% | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 |
|--------------------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| Gravel | 6 | | | 1 | | 1 | 1 | | | | | | | 1 | | 2 | | | | |
| Clay | 1 | | | | | 1 | | | | | | | | | | 1 | | | | |
| Sand | 2 | | | | | | | | | | | | | | | 1 | | | | |
| Grass | 2 | | | | | 1 | | 1 | | | | | | | | 1 | | | 1 | |
| Surfaced | 2 | | | | | | | | | | | | | | | 1 | | | | |
| Cinders and Gravel | 1 | | | | | 1 | | | | | | | | | | | | | | |

TABLE 6
Percentage Distribution of Surfacing Found on All School Playgrounds

| Types | 100% | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 |
|--------------------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| Gravel | 14 | | 5 | 1 | 1 | 3 | 2 | 2 | 1 | | 2 | | | 1 | 1 | 2 | | 1 | | |
| Clay | 4 | | | | | 2 | | | 2 | | 2 | | | | | 1 | | | 1 | |
| Sand | 4 | 1 | | | 1 | | | | 1 | | | | | | | 1 | | | 1 | |
| Grass | 3 | | 1 | | 2 | 1 | | 1 | | | 2 | | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 |
| Surfaced | 5 | | | | | | 1 | | | | 1 | | 1 | | 1 | 1 | 3 | 1 | 6 | 4 |
| Cinders | 2 | | | | | | | | | | | | | | | | | | | |
| Cinders and Gravel | 1 | | | | | 1 | | | | | | | | | | | | | | |
| Crushed Stone | | | | | | | | | | | | | 1 | | | | | | | |
| Sand and Clay | | | | | 1 | | | | | | | | | | | | | | | |
| Unimproved Street | | | | | | | | | | | | | | | | | | | | 2 |

¹ "Play Areas, Their Design and Equipment," Chapter V. "The Children's Playground," pages 96 to 102.

² "The Organization and Administration of Playgrounds and Recreation," page 271.

Observation of Tables 3, 4, 5, and 6 show that there are many types of surfacing for play areas and that there does not seem to be any method favored in any section of the country.

CONCLUSIONS

1. That despite the great amount of studying that has been done on this problem there does not seem to be any standard followed for surfacing play areas in the schools that were examined for this study.
2. Inspection of these tables would seem to indicate that surfacing of playgrounds has been more or less haphazard.

Suggestions for Further Study

A study of a larger group of schools as to their play facilities would be of value so that more definite conclusions might be drawn as to the influence of various factors.

A study of a group of schools as rated by the Superintendent and classed on the basis of 1, 2, 3, 4, 5 and results compared with standards of authorities might be of value in studying the trend in present school policies for providing play facilities.

Studies of various types of surfacing adapted to different regions of the country and climatic changes would be valuable. The Detroit Study and Chicago recommendations are suitable for those localities. But good surfacing for loam in the Great Lakes region might be entirely different than for loam in the south.

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A Study of the Relation of Athletic Skills and Strengths to Those of Posture

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Introduction

The Problem

THE medical profession in general accepts that habitual poor posture may lead to many functional and structural disorders of the body, such as strains of joints and ligaments, enteroptosis, albuminuria, impairment of the circulation, nervous derangements, and tuberculosis.*

Because of this fact, health educators are deeply concerned with improving the postures of individuals. Their interest is concentrated mostly in children, for it is during the earlier, more plastic years of life that good or bad habits of posture are most easily acquired.

However, the health education teachers are handicapped in getting results at the very start, due to the decided and natural lack of posture interests in the child and in the adult. The reasons for this are: first, posture standards are set up by society as the result of research, and few individuals have inherent interests in these standards; second, there is no immediate satisfaction from following and abiding by posture standards; and third, the results of bad posture practices are not immediately experienced.

In view of the lack of interest in posture problems, a most important factor in this phase of education is to approach the situation from a psychological angle, that is, by trying to build an interest in posture by appealing to some other interest inherent in the individual.

Children and a goodly number of young men and women and adults are vitally interested in "total-body," or athletic, activities. They desire not only "to do" but "to do well." If then, it were definitely known that posture and athletic achievement were positively correlated, the health educator would have a very practical and valuable approach to the posture problem by being able to appeal for better posture to this "life purpose" of the individual to achieve athletically.

* An Abstract of a M.A. Thesis submitted in the School of Education of New York University.

The tendency, today, is to believe that there exists a fairly definite positive relationship between posture and athletic accomplishment. This position, however, is not substantiated by any wealth of scientific data. To the knowledge of the writer, the only available intensive studies of the subject are: first, "A Study of Posture and Its Relationships,"¹ an experiment performed in the Grand Rapids Public Schools, Grand Rapids, Michigan, in which it was found that a positive correlation between posture and athletic accomplishment existed, but it was not high; and second, the unpublished work of Harriet P. Rawles, "Objective Evaluation of Standards and Types of Posture," in which she concludes after experimenting with three hundred young adult women that "it appears that there is much current exaggeration of the connection in the adult between posture and performance efficiency, physical or intellectual."

The results of these two experiments show how sadly the profession of physical education is in need of further experimentation to bear out, or disprove, its beliefs in this problem.

Purpose of the Study. It is the purpose of this investigation, therefore, to study experimentally, the relationship between posture and athletic achievement. In other words, what light does a controlled experiment throw on the common belief in physical education that good posture and excellence in athletics go hand in hand?

Method and Sources of Data. 1. To realize on the "purpose" it was decided to conduct an experiment with individuals, in which they would be subjected to a posture examination and various physical efficiency tests.

The study and its results are confined to boys. However, there seems to be no valid reason for believing that different results would be obtained had girls been included in the experiment.

2. Only boys of early adolescence (12— to 15± years³) were included in the study. They were obtained at the following places: one hundred boys from the Central Jewish Institute Camp, Port Jervis, N. Y.; forty-one from Camp Pratt, Y.M.C.A. summer camp, Princess Bay, Staten Island, N.Y.; twenty-five from two New York City playgrounds; and sixty-seven boys from the Highland Park and Queens Central branches of the Y.M.C.A. in Brooklyn and Queens. In all, two hundred and thirty-three boys participated in the experiment.

The boys were selected at random, every effort being made to obtain a normal distribution on the basis of both achievement and posture.

The early adolescent group was chosen for this experiment be-

¹ Dunbar, R. C., "A Study of Posture and Its Relationships." Am. Phys. Ed. Rev. Feb., March, and April, 1927.

² Rawles, H. P., "Objective Evaluation of Standards and Types of Posture." Unpublished M. A. Thesis. Wellesley College, Wellesley, Mass. June, 1925.

³ Hetherington, C. W., "Manual in Physical Education for the Public Schools of the State of California." California State Printing Office, Sacramento, Calif. 1919. p. 23.

cause it was felt that at this age there would be less specialization in athletics than found in succeeding age groups, a fact which undoubtedly would make a difference in the results.

3. The age, height, weight, and posture of each boy was recorded, the latter according to the technique described in Appendix B. The posture examination was conducted by the investigator. In this way, discrepancies which creep in when the examining is done by a number of individuals, each with his own standards and methods of grading posture, are eliminated.

No attempt was made to make this experiment of educational value to the children during the time of the posture examination, for to do so was to put them on their guard and to help defeat one of the purposes, the discovery of habitual postures. This examination was conducted as informally as possible, the usual camp attitude being retained throughout, again hoping that through such a procedure and under such environmental conditions the children would show themselves in their true, everyday attitudes.

4. The ages, heights, and weights of the children were used in determining a classification index for fairness in athletic competition (a modification of C. W. Hetherington's classification for fairness in decathlon tests⁴). Prof. Hetherington's classification scheme was used as the basis of this part of the present experiment because of its general acceptance by physical educators.

5. The individual achievement was recorded in six athletic events, namely, the 100 yard dash, the running broad jump, standing broad jump, push-ups, basketball foul throw for goal, and basketball pass for accuracy.⁵

6. The results of the athletic events were tabulated for each "class," as determined by the age, height, and weight index mentioned above, and for each posture group and the average records were computed.

7. Conclusions are reached by comparing the average records for the posture groups within the various classes.

Results of the Posture Examination and Athletic Tests

As a basis for comparison in the athletic events the boys were divided into postural groups according to the technique described in Appendix B. A further classification was necessary to make the comparison a fair one. Obviously it is unfair to judge the achievement of individuals in athletic tests regardless of factors which make it possible for one to achieve in such tests, such as age, height, weight, experience in the activity, etc. Hence, to provide this element of fairness, as much as was possible and practical, the boys were divided into "Athletic Classes" as indicated in "Method and Sources of Data,"

⁴ Hetherington, C. W., "Scoring Chart for Decathlon—High School Boys." Am. Phys. Ed. Ass., Box 362, Ann Arbor, Michigan. May, 1924. Reprint.

⁵ See Appendix C for special rules for the events.

according to a modification of the scheme used by C. W. Hetherington in classifying school boys for fairness in decathlon tests. Prof. Hetherington, on theoretical grounds, takes four factors into consideration in determining the individual's "Athletic Class," namely, the age, height, weight, and school grade of the individual. This method has proven itself a practical and efficient one whenever used. In this study, however, where the experiments were carried on outside of the school, it was deemed advisable to eliminate the school grade factor, on the ground that there was no ready means of checking up on it; and the age, height, and weight finally determined the present classifications.

When classified according to these factors, the boys in this experiment fell into five classes. For convenience, the classes will be designated numerically, I for the low class, to V, for the highest.

When classified into athletic classes and postural groups, the two hundred and thirty-three cases are distributed as shown in Table I. The majority of cases fall into class II, while in classes IV and V and in posture groups A and D, comparatively few are found.

It is known that at present poor posture is more prevalent than good posture and the results of this study verifies that. The decided tendency to poorer posture, however, as shown in Table I, in that the combination of the C and D groups more than doubles the grand total of A and B postures, may be accounted for somewhat by the fact that during early adolescence bodily growth is such that the maintenance of the correct upright posture is exceedingly more difficult than at maturity.*

Table I
Distribution of Boys into
Classes and Postural Groups

| Posture Groups | : | Classes | | | | | : | Totals |
|-------------------|---|---------|-----|-----|----|---|---|--------|
| | : | I | II | III | IV | V | : | |
| A | : | 0 | 2 | 2 | 0 | 0 | : | 4 |
| B | : | 8 | 37 | 15 | 9 | 2 | : | 71 |
| C | : | 23 | 60 | 23 | 14 | 4 | : | 124 |
| D | : | 5 | 24 | 3 | 1 | 1 | : | 34 |
| Totals | : | 36 | 123 | 43 | 24 | 7 | : | 233 |

Caution should be used in interpreting the records of Classes IV and V and of posture groups A and D because of the extremely small number of cases found therein. Class II, which contains the majority of cases, is the only class numerically large enough to permit the derivation of any conclusions. The results obtained in the other classes, however, do help to shed some light on the problem. In comparing the achievement of the various groups only arithmetical averages were used. The numbers are too small to permit the use of

* DiGiovanna, V. G., "A Study of the Relation of Athletic Skills and Strengths to Those of Posture." M.A. Thesis. School of Education, New York University. 1929. pp. 29-33.

more refined statistical techniques, particularly the use of the formula for determining the reliability of differences between two averages. Only tentative conclusions, therefore, can be reached from these findings, more definite conclusions awaiting a more elaborate experiment.

For ease of comparison, the athletic achievements of the boys in the six events included in this experiment, are classified according to postural groups and athletic classes in the tables which follow.

Table II presents the results in the 100 yard dash.

| Classes | Posture Group | Number of Cases | Range of Achievement (seconds) | Average Achievement (seconds) |
|---------|---------------|-----------------|--------------------------------|-------------------------------|
| I | A | 0 | | |
| | B | 8 | 13.8—17 | 15.2 |
| | C | 23 | 14.8—22 | 16.8 |
| | D | 5 | 15.6—16.8 | 16.2 |
| II | A | 2 | 13.6—16.4 | 15. |
| | B | 37 | 12.8—17.3 | 15.6 |
| | C | 60 | 13.4—18.6 | 15.7 |
| | D | 24 | 13.8—18.2 | 16. |
| III | A | 2 | 13. —15.6 | 14.3 |
| | B | 15 | 12.6—16.8 | 14.7 |
| | C | 23 | 12.6—18. | 14.9 |
| | D | 3 | 15. —17.8 | 16.7 |
| IV | A | 0 | — | |
| | B | 9 | 12. —17.4 | 15.7 |
| | C | 14 | 13.6—19.6 | 15. |
| | D | 1 | 16.4— | 16.4 |
| V | A | 0 | — | |
| | B | 2 | 12.8—13. | 12.9 |
| | C | 4 | 13. —14.2 | 13.4 |
| | D | 1 | 13.8— | 13.8 |

From Table II it will be seen that within class II, the better posture groups are superior to the poorer groups. The B group is one-tenth and four-tenths of a second more efficient than the C and D groups respectively. Records in the other classes show this same tendency. However, in class I, group D outscores group C, but it is distinctly inferior to group B. Between the groups B and C in class IV another inconsistency is found in that the C group scores more proficiently than the B group. In evaluating these last results, however, account must be taken of the small number of cases involved.

The range of achievement throughout the various classes, indicates that regardless of posture, there is a general over-lapping of the achievement of the individuals.

Table III presents the results in the running broad jump. It can

Table III
Achievement in the Running Broad Jump

| Classes | Posture Group | Number of Cases | Range of Achievement (ft. & in.) | Average Achievement (ft. & in.) |
|---------|---------------|-----------------|----------------------------------|---------------------------------|
| I | A | 0 | - - | - |
| | B | 8 | 11- 5— 6- 4 | 9- 9.1 |
| | C | 23 | 12- 2— 6- 2 | 9- 6. |
| | D | 5 | 10-10— 8-10 | 9- 6.8 |
| II | A | 2 | 12- 9—10- 4 | 11- 6.5 |
| | B | 37 | 13- 2— 6- | 9-10.9 |
| | C | 60 | 12- 5— 7- 1 | 9- 9. |
| | D | 24 | 11- — 6- 2 | 9- 4.7 |
| III | A | 2 | 13- 3—11- 6 | 12- 4.5 |
| | B | 15 | 13- 2— 8- 8 | 11- 3.3 |
| | C | 23 | 14- 5— 7- 6 | 10- 4.6 |
| | D | 3 | 11- 2— 7- 7 | 9- |
| IV | A | 0 | - - - | - |
| | B | 9 | 14- 6— 8- 6 | 10- 9.5 |
| | C | 14 | 13- 1— 5- 9 | 10- 6.3 |
| | D | 1 | 11- 7— - | 11- 7. |
| V | A | 0 | - - - | - |
| | B | 2 | 12-6.5—11- 9 | 12- 1.7 |
| | C | 4 | 14- 2— 9- 9 | 12- .25 |
| | D | 1 | 10- 6— - | 10- 6 |

Table IV
Achievement in the Standing Broad Jump

| Classes | Posture Group | Number of Cases | Range of Achievement (ft. & in.) | Average Achievement (ft. & in.) |
|---------|---------------|-----------------|----------------------------------|---------------------------------|
| I | A | 0 | - - | - |
| | B | 8 | 5-9.5— 4- 8 | 5- 3.9 |
| | C | 23 | 5-11— 3-10 | 5- .7 |
| | D | 5 | 6- — 5- 2 | 5- 6.1 |
| II | A | 2 | 6-8.8— 5- 2 | 5-11.4 |
| | B | 37 | 6- 5— 4- 2 | 5- 6 |
| | C | 60 | 6-10— 3- 5 | 5- 4.8 |
| | D | 24 | 6-4.5— 4- 5 | 5- 4.1 |
| III | A | 2 | 6- 6— 6- 3.5 | 6- 4.4 |
| | B | 15 | 7- 2— 4-11.5 | 6- 2.8 |
| | C | 23 | 6-11.5— 4- 6 | 5-11.3 |
| | D | 3 | 6- 3— 4- 6 | 5- 1.5 |
| IV | A | 0 | - - - | - |
| | B | 9 | 7-4.5— 5- 3 | 6- .7 |
| | C | 14 | 7-2.5— 4-10 | 6- 1.3 |
| | D | 1 | 5- 7— - | 5- 7 |
| V | A | 0 | - - - | - |
| | B | 2 | 7-6.5— 6- 9 | 7- 1.7 |
| | C | 4 | 7-1.8— 6- 4 | 6- 9 |
| | D | 1 | 6- 1— - | 6- 1 |

be seen that in this event there seems to be a very definite relationship between posture and achievement. In some instances the difference in the achievement of the various posture groups is slight, while in others a great difference is shown. Only one of the twenty groups fails to show this tendency. Group D of Class I, composed of five cases, scores an average achievement of 9'-6.8" to 9'-6" for group C of the same class, which is composed of twenty-three cases.

The best individual record scored in this event, however, in group C—class I, group B—class II, group C—class III, and group C—class IV, as compared to the best individual record of the postural group above them, shows quite clearly that as far as individual cases are concerned, posture and achievement do not seem definitely related.

The results in the standing broad jump, as indicated in Table IV, show from a study of the average achievement of the postural groups in classes II, III, and V, that the A groups outscored the B groups, which in turn outscored the C groups, which proved superior to groups D. In class II, the differences in achievement of the posture groups are small but quite regular, while classes III and V show more decided differences.

It is found that, again, group D of class I, composed of five cases, outscored the C group. Group B of class IV, also proves slightly inferior to the group below it.

The "Range of Achievement" again shows the decided tendency

Table V
Achievement in the Push-Up Test

| Class | Posture Group | No. of Cases | Range of Achievement | Average Achievement |
|-------|---------------|--------------|----------------------|---------------------|
| I | A | 0 | — | — |
| | B | 8 | 24— 8 | 14.9 |
| | C | 23 | 19— 2 | 8.6 |
| | D | 5 | 10— 7 | 8.6 |
| II | A | 2 | 20—18 | 19. |
| | B | 37 | 20— 1 | 8.8 |
| | C | 60 | 24— 0 | 7.3 |
| | D | 24 | 16— 0 | 6.5 |
| III | A | 2 | 25—20 | 22.5 |
| | B | 15 | 22— 3 | 12.8 |
| | C | 23 | 27— 0 | 10.2 |
| | D | 3 | 10— 0 | 3.3 |
| IV | A | 0 | — | — |
| | B | 9 | 25— 2 | 10.8 |
| | C | 14 | 15— 4 | 9. |
| | D | 1 | 3 | 3. |
| V | A | 0 | — | — |
| | B | 2 | 16—15 | 15.5 |
| | C | 4 | 16— 9 | 11.8 |
| | D | 1 | 8 | 8. |

for different postural groups to overlap in their achievement.

Table V, in presenting the results of the test in push-ups, again seems to indicate that on the average, within this group, the more able to achieve are those having the best postures. Every class shows this relationship. Group D of class I, again seems to prove the exception, in that it equals the score of the group immediately above it. It does not, however, outscore the B group of the same class. Rather the results show a decided advantage for the higher group.

In comparing the results in this test, if the extremes are used (when the numbers involved make it advisable) a more vivid relationship may be seen between the ability to achieve and posture.

The "Range of Achievement" shows, though not quite as definitely as in the previous tests, that for some individuals, posture apparently does not affect the ability to achieve in definite athletic events.

Table VI
Achievement in the Basketball Throw
For Accuracy

| Class | Posture Group | No. of Cases | Range of Achievement | Average Achievement |
|-------|---------------|--------------|----------------------|---------------------|
| I | A | 0 | — | |
| | B | 8 | 3— 0 | .6 |
| | C | 23 | 6— 0 | 1.1 |
| | D | 5 | 0— 0 | 0. |
| II | A | 2 | 7— 3 | 5. |
| | B | 37 | 9— 0 | 2.8 |
| | C | 60 | 8— 0 | 2.6 |
| | D | 24 | 7— 0 | 2.3 |
| III | A | 2 | 7— 5 | 6. |
| | B | 15 | 9— 0 | 4.2 |
| | C | 23 | 8— 1 | 4.9 |
| | D | 3 | 6— 0 | 2.3 |
| IV | A | 0 | — | |
| | B | 9 | 9— 2 | 4.7 |
| | C | 14 | 10— 1 | 5.6 |
| | D | 1 | 6— | 6. |
| V | A | 0 | — | |
| | B | 2 | 8— 6 | 7. |
| | C | 4 | 10— 6 | 8. |
| | D | 1 | 6— | 6. |

In Table VI, which gives the achievement in the basketball throw for accuracy, conflicting results are found. Although class II indicates that the most proficient are those having the best postures, the other classes, for the greater part, fail to support this result. While class II is the largest and seems the only one from which conclusions may be derived with any degree of safety, the negative results in the other classes seem of sufficient importance to warrant a doubt, as to

whether, in this event, there is a relationship existing between posture and achievement.

The fact that numerous scores of zero were made, plus the fact that the element of skill enters strongly into this type of event, may have a bearing on the results.

Table VII
Achievement in the Basketball Throw
For Goals

| Class | Posture Group | No. of Cases | Range of Achievement | Average Achievement |
|-------|---------------|--------------|----------------------|---------------------|
| I | A | 0 | — | |
| | B | 8 | 4—0 | .8 |
| | C | 23 | 1—0 | .17 |
| | D | 5 | 3—0 | 1. |
| II | A | 2 | 2—1 | 1.5 |
| | B | 37 | 5—0 | 1.1 |
| | C | 60 | 5—0 | 1.6 |
| | D | 24 | 5—0 | 1.1 |
| III | A | 2 | 4—2 | 3. |
| | B | 15 | 7—0 | 2.1 |
| | C | 23 | 6—0 | 1.1 |
| | D | 3 | 8—0 | 3. |
| IV | A | 0 | — | |
| | B | 9 | 4—0 | 1.8 |
| | C | 14 | 8—0 | 2.1 |
| | D | 1 | 1— | 1. |
| V | A | 0 | — | |
| | B | 2 | 6—0 | 3. |
| | C | 4 | 3—0 | 1.5 |
| | D | 1 | 2— | 2. |

Table VII presents the achievement in the basketball throw for goals. Here no relationship seems to exist between posture and achievement. All the groups and classes scored in such a manner that no definite conclusion could be formulated from the results.

This event proved to be the most difficult test for the boys, from the point of view of scoring. Exceedingly low scores were the rule, ninety-five of the cases failing to make a single goal. It does not seem reasonable to believe that all ninety-five cases scoring zero have the same ability. Rather, it seems that this event does not belong in an experiment of this sort because it does not measure the absolute ability of the individual. The element of skill also enters greatly into the ability to score in this event and on this basis it would also seem that this type of test ought not to be included in studies of this sort.

Summary

This study, as a controlled experiment, attempts to throw light on the belief in physical education that posture and the ability to achieve in athletics are positively related.

In order to realize on this purpose, two hundred and thirty-three boys, of early adolescent years, were subjected to a posture examination and to various athletic tests, namely, the 100 yard dash, the running and standing broad jumps, push-ups, and basketball throws for accuracy and for goals.

In judging the achievement of the individuals in the postural groupings, further divisions were made, for the purpose of obtaining fairness in competition, according to an age, height, and weight index of the individual.

The results of the posture examination and of the athletic tests, as given, show that:

1. Class II contained the majority of the cases and it was the only one numerically large enough to permit the derivation of any conclusions.

2. Arithmetical averages were used to compare the achievement of the various groups, the numbers being too small to permit the use of more refined statistical technique. Only tentative conclusions are expected to be drawn from this study, more definite conclusions awaiting a more elaborate experiment.

3. Poor posture is decidedly more prevalent than good posture in this group, possibly due somewhat to the fact that during the age period included in the experiment bodily growth is such that the maintenance of the correct upright posture is exceedingly more difficult than at maturity.

4. In comparing the achievement of the various posture groups within class II, only one event, the basketball throw for goals, failed to show that the better the posture, the better the achievement. In many cases the differences between the achievements of the posture groups compared was quite small and in others, relatively large. This tendency found within class II is supported by the results in the other classes except for the following instances:

- a. In class I, group D outscored or equalled the achievement of group C in four events, namely, the 100 yard dash, the running and standing broad jumps, and the push-ups. In only one event, however, did this group outscore the B group of the same class. Taking into account that group D is composed of only five subjects, the results do not bear much weight.

- b. In class IV, group C proved more efficient than group B. Here again, the small number of cases involved diminishes the importance of the data.

The basketball throw for goals showed no relationship between posture and achievement. This test and the basketball throw for accuracy are poor ones to use in this type of experiment, in that the

element of skill enters greatly into the ability to score in them and in that they do not measure absolute ability.

5. The "Range of Achievement" throughout the six events indicates that regardless of posture there is a general over-lapping of the athletic ability of individuals.

Conclusions. Within the group studied, there seems to be a fairly definite tendency for posture to be positively related to athletic achievement, and that regardless of posture there is a general over-lapping of the athletic ability of individuals.

However, when taking into account the small number of cases involved, and the non-statistical treatment of the data, these conclusions must necessarily be tentative in character. More definite conclusions must await the application of the techniques employed in this experiment to other and larger groups.

APPENDIX A

Table of Individual Record. This consists of 233 Individual Records for age, weight, height, class, posture grade, 100-yd dash, running broad jump, standing broad jump, basketball goals, basketball accuracy and push ups.

APPENDIX B

Technique of the Posture Examination

Each individual was given an intensive segmental posture examination, and a final check-up of general posture. The technique used in the examination is as follows:

1. The boy disrobed entirely.
2. He was observed as he walked toward the examiner and peculiarities (if any) in his gait and general muscle tone were noted. He was classified by a general inspection into one of the three body types, stocky, slender, intermediate.
3. Examining him from the rear, it was noted whether there existed—lateral deviations in the position of the head and spine, any tilt of the shoulders and hips, any prominence of the scapulae, "knock-knees," or "bow-legs," pronation, flat feet, and tendo-achilles deviations. A check-up of the observations was made with the help of a plumb-bob.
4. Next, the boy was examined from the side and antero-posterior deviations in the position of the head and in the curves of the spine were observed. The contour of the chest and abdomen were noted for flat or "barrel" chest and protruding abdomen. A forward or backward tip of the pelvis and hyper-extension or flexion of the knees were also looked for. These observations were also checked with the help of the plumb-bob.
5. From the front, a further observation was made of chest, hip, knee, and foot conditions. The alignment of legs and feet was tested with the help of the plumb-bob.
6. The boy's gait was again observed as he walked away from the examiner.
7. A mental comparison was made between the findings in the examination and the standards as illustrated in the posture charts. A grade "A," "B," "C," or "D," was given accordingly.

* Posture standard cards used are published by Children's Bureau, United States Department of Labor, Washington, D.C.

APPENDIX C

The Athletic Events and Special Rules

- (1) 100 yard dash—one trial only allowed.
- (2) Running broad jump—three jumps allowed each contestant, the best jump of the three being scored. The jump is measured from the toe at the "take-off" to the heel in landing. (The "take-off" board was disregarded for measuring purposes for two reasons, first, because the boys were inexperienced in "hitting" the board, and second, because the desire was to measure the actual jumping ability.)
- (3) Standing broad jump—three jumps allowed each contestant, the best jump of the three being scored.
- (4) Push-up. (From the leaning rest.)—hands on the ground, shoulder width apart, legs extended to the rear, supporting the body on the arms and toes, arms straight, body in one straight line from head to heels (leaning rest position.) Bend arms slowly until chest touches the ground. Straighten the arms and resume the first position. Hips may be slightly elevated to avoid the swayed back. The number of times this procedure is repeated, with the proper form, is scored.
- (5) Basketball pass for accuracy—the ball is thrown at a circle five feet in diameter, marked on a wall, the center of the circle five feet from the ground. The ball is thrown from a line forty feet from the wall. Ten trials are allowed for score. (One preliminary practice throw allowed.)
- (6) Basketball throw for goal. Ten tries allowed from the "foul" line. Chest throw only permitted. (One practice throw.)

APPENDIX D

C. W. Hetherington's Classification Chart for fairness in competition was used with modification for the experiment. This is the age, grade, height, and weight plan often referred to as the "exponent" plan.

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The Health of the Teacher

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"THERE is nothing which tends to make a teacher so ineffective as failing health."¹

"The conclusion can be nothing else than that it is the duty of the profession, and of every member in it to do everything possible to safeguard her own health and the health of others of her profession."²

"There are many factors in school efficiency about which we know little; the health of the teacher is one. Vigorous practical measures ought to be the product of definite knowledge, and such knowledge as we have suggests that we should pursue six distinct policies:

"1. The establishment of an efficient health examination of candidates for entrance into professional training or practice.

"2. The provision of an adequate training in hygiene and sanitation for all teachers.

"3. The adoption of measures that will guarantee a distribution of teachers among lines of work that are most congenial to personal temperament, training, and taste, and therefore less injurious to physical and mental health.

"4. The improvement of the physical condition of classroom life so as to approximate the best standards of hygiene and sanitation.

"5. The betterment of the methods of school administration and supervision so that the demands of a constantly evolving school system shall be transmitted to the teacher with due regard to the personal equation in effective workmanship.

"6. The fostering of an intelligent appreciation on the part of the public that teachers, just because they are in a business that is exhausting, are entitled to a normal, restful, and recreational personal and social life."³

Three Things Emphasized

The three quotations given emphasize three things:

1. The fact that little is known about the health of the teacher.

¹ Arthur C. Benson, University of Cambridge, Presidential Address to Teachers Guild, 1908.

² J. C. Almack and A. R. Lang, "Problems of the Teaching Profession," Houghton Mifflin Company, Boston, 1925.

³ Henry Suzzallo in the editor's introduction to "The Teacher's Health," Houghton Mifflin Company, Boston, 1913.

2. That it is a definite problem which looks for its solution to the careful selection of candidates for teacher-training institutions.
3. That in its importance in its relationship to successful teaching it is second to none.

Fundamental Aspects

A general survey of the problem indicates two fundamental aspects: "The elimination of disease; and the upbuilding of vigor and health. These are of course, inextricably interrelated and interdependent. In practically all our activities we assume that individuals are strong, full of vitality, able to endure and enjoy. An industry or an educational system is only half efficient when it must be constantly allowing for the absences of one worker today and another tomorrow. Not only is the labor of the individual lost, but the whole routine of operations is upset. As for the individual himself, health is at the basis of his whole life. If he is vigorous and strong, he will find pleasure in all activities—in work, in play, in social entertainments, in community enterprises. As we learn how to make life more vigorous we make it more worth while."⁴

Physical Inefficiency is Costly

The teacher, who because of poor physical condition is able to work at a 60% efficiency rate is earning far less than 60% of the salary she is paid. Her work affects the work of everyone in her room and in her building. Good supervision must aid her in keeping her health up to a high degree of perfection; it must recognize the strain under which she is working and will seek to lighten that strain; it must promote good health by eliminating as far as lies within its power, the causes of ill health. Careful selection by the teacher training institutions of candidates for the profession on a health basis, must come about if only the physically fit are to be in our school-rooms.

Perfect Health Necessary to High Efficiency

It is generally agreed that people who amount to most in this world are tremendously alive in all of their senses. It is only the teacher who is in perfect health who possesses the spontaneity which is so much in demand. This spontaneity determines the set that is taken toward any problem, the attitude which exists, the state of mind as it were. Someone has said:

"Tis the set of the sails, and not the gales,
That bids them where to go."

⁴ Joseph K. Hart in "Social Life and Institutions," World Book Company, Yonkers-on-the-Hudson, 1924.

And it is surely the health of the teacher that "sets the sails" in her ability to do effective work. This thought may be summed up in the homely epigram "Whether life is worth living does depend to a great extent upon the liver."

The Health of Our Young Men and Women

The army-draft medical examinations of a few years ago jarred the American nation out of a complacent attitude regarding the health of its young men.⁸ Dr. Cubberley points out that had our young women of the same ages been called up for important national duty there is every reason to think that an even larger percentage among them would have been rejected. While the persons entering the teaching professions are to a great extent a selected group and there is probably a higher degree of physical perfection, yet the writers feel from their experience in both the military service and in the schoolroom, that the former is no more in need of splendid physical condition on the part of its personnel than is the latter. A survey of the health of all our teachers of all ages, men and women, by means of examinations as rigorous and thorough as those given by the military service boards would likely find a very large per cent of our teachers excluded from schoolroom service.

The growth of teacher-training institutions is steadily on the increase as is shown by the fact that in the year 1919-1920 there were forty-six teachers colleges, while in the year 1927-28 the growth had increased the number to one hundred and thirty-seven teachers colleges. These figures would indicate that this type of institution is to play a more and more important part in the training of teachers and, that it is to this type of institution we must look for the selection of teacher types that are not only mentally capable, but physically capable as well.

The importance which administrators place upon the question of the teacher's health and physical well-being before considering her for a position is emphasized by the fact that every recommendation blank sent out to gain information relative to the employment of a prospective teacher, makes some reference to her physical qualifications for the job. It is universally true, also, that the average college or public school official has no definite information with which to substantiate the "Good" or "Very Good" check mark which he generously gives.

With the thought expressed by the preceding paragraphs in mind, that is, that teaching demands much of the teacher from the physical efficiency basis, the writers have made an attempt to determine what steps teacher-training institutions are taking to secure candidates for

⁸ Ellwood P. Cubberley, "Public Education in the United States," Houghton Mifflin Company, Boston, 1919.

the profession who are physically as well as mentally fitted for the strenuous days ahead.

A survey of the latest catalogs available from one hundred fourteen teachers colleges was used as the basis for this study. This list of schools was taken from the Education Directory⁶ of the United States Bureau of Education for the year 1929, and represents thirty-four states and 129 institutions of four year rank, all of them possessing the degree granting privilege. Catalogs (1929-30) were available from but 114 of the 129 institutions.

To give an idea of what is being done in this respect by the various sections of the country, the United States has been divided into groups. The groups are designated as Group I (New England States); Group II (Middle States and Maryland); Group III (North Central States); Group IV (Southern States); and, Group V (Western States). In the last group, which is composed of seven states, but one state, California,⁷ according to the Education Directory, has any four year teachers colleges. This state has seven institutions.

Teachers Colleges Requiring Physical Examination for Entrance

Read the table thus: In Group I, there are six institutions. Three of these institutions require a physical examination by the college physician for entrance. Two require the physical examination, but do not state by whom it is to be made. One institution states it requires only a "statement of good health."

| Classification | Group I | Group II | Group III | Group IV | Group V | Total |
|--|----------|----------|-----------|-----------|----------|-----------|
| No. Institutions | 6 | 11 | 63 | 27 | 7 | 114 |
| Exam. by College Physician | 3 50% | 9 82% | 13 21% | 4 15% | 4 57% | 33 29% |
| Exam. by Whom Not Stated | 2 31% | 2 18% | 12 19% | 2 7% | 1 14% | 19 17% |
| Student must Furnish Evidence of Good Health | 1 17% | 0 | 5 8% | 3 11% | 0 | 9 8% |
| Good Health Statement | 0 | 0 | 3 5% | 2 7% | 2 29% | 7 8% |
| Certificate of Small Pox Immunity | 0 | 0 | 2 3% | 1 4% | 0 | 3 3% |
| May Require Exam. at any Time | 0 | 0 | 0 | 1 4% | 0 | 1 1% |
| Catalogs Failing to Report | 0 | 0 | 28 44% | 14 52% | 0 | 42 37% |

⁶ Education Directory, Department of the Interior, Bureau of Education, Bulletin, 1929.

⁷ California was included in the Western group although it is not a member of an official regional grouping.

Of the total one hundred fourteen institutions studied, the above table shows that seventy-two, or 63%, make some provision for the physical status of the candidate seeking admission. There were forty-two (37%) of the institutions that failed to include in their catalogs any mention of such a subject. Thirty-three, or 29%, of the institutions require a physical examination, and definitely state that this examination must be given by the college physician before the candidate may enter.

Nineteen institutions (17%) require that the candidate must be examined, but do not specify by whom the examination is to be made. Nine, or 8%, state that a certificate giving evidence of good health must be presented. Where this certificate is to come from, none of the institutions see fit to mention. Seven (6%) make their only requirement to be a statement of good health, which may mean much or little. Three (3%) make no other requirement than that the candidate must have been vaccinated for small pox, and one institution has the requirement that it may require an examination at any time.

It is worthy of note that greater differences seem to exist within a regional grouping than among the different groups. It would seem to be commendable that in the majority of the institutions requiring a physical examination, said examination is given by the college physician rather than by the student's home physician.

It is evident, as a study of the catalogs of the teacher-training institutions shows, that teachers colleges as a whole, have not generally agreed that the physical fitness of candidates is of much consequence. If this conclusion is without foundation, the only possible other conclusion must be, that no one seeks to enter the teaching profession who is physically unfit, hence the examination is unnecessary. There is considerable evidence that a good many teachers colleges are still far behind in this respect, and have standards on a par with those of seventy-five years ago. The Common School Journal for the year 1839 indicates the health requirement for entrance to the teaching profession of that day to be, "Candidates must be free from any disease or infirmity which would unfit them for the offices of teaching." However, as is still true today, it does not in any way indicate how the diseases and infirmities were to be detected.

Summary

The following statements regarding the physical examination situation, and the health situation in general among our teachers, seem justified:

1. The health of the teacher is of prime importance.
2. Very little is known about the health of the teacher.
3. The problem is a definite one which looks for its solution to

careful selection by the teacher-training institutions.

4. School administrators are asking for physically sound teachers but there are no indications that the average health endorsement means anything.
5. But 63% of teachers college catalogs make any mention of the physical condition of the prospective teacher at the time of her matriculation.

Exercise and Physical Development

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Preface

THE study as carried on in this thesis was actuated by a desire to find if possible the relation between physical activities of college men and body developments in size and strength.* The development of skills and organic efficiency is probably of as great importance but should be made the object of a separate study.

In the decade following 1900 considerable attention was given to anthropometric study. Valuable work was contributed by the following men: Dr E. Hitchcock, Amherst College; Dr. Henry C. Beyer, Surgeon General U. S. Navy; Professor Bird T. Baldwin, University of Iowa; Dr. Jay W. Seaver, New Haven, Connecticut; Dr. L. Gulick; Dr. Franz Boas; Dr. J. H. Kellogg; Dr. D. A. Sargent; and others.

Measurements similar to those in this thesis were made by Dr. Hitchcock¹, of Amherst College students, but as far as can be found were not used for the purpose of indicating possible results of different types of exercises, as attempted in this work. Dr. Beyer² did not attempt to show the influence of exercise on growth but his procedure is of a different nature than that followed in this study, making a comparison of results impossible.

The writer has attempted to show the results of each semester's physical work over a period of years on men at the University of Nevada, Reno, Nevada. This work includes sports as well as regular gymnasium classes.

Introduction

Some forms of physical exercise are apparently of more value than others. It is equally apparent that vigorous physical activity should not cease with graduation from college.

Observation further discloses the fact that certain forms of activity are stressed in college for no obvious reason unless possibly because of the decree of tradition. A great part of the physical pro-

* Summary of a Thesis Presented for Master's Degree at Springfield Y.M.C.A. College.

¹ Hitchcock, E., *Anthropometric Handbook of Amherst College*, 1902.

² Beyer, H. G., *The Influence of Exercise on Growth*.

grams in general has no carry-over value or appeal and, as a consequence, our college graduates, quickly becoming absorbed in their various professions, fail to get enough exercise to keep themselves in good physical condition.

With inadequate time allotments, as is universally the case for the physical education program, it is possible to be of more service to the individual by omitting activities that do not prove valuable and stressing those that do show good results. Some attempt should be made to develop skill in a type of activity that may be carried on through life with pleasure and profit.

This study has been made to determine if possible the effects resulting from various activities. While emphasis is on strength and muscular development the organic condition is measured in a small way by the endurance test.

Types of physical activity were studied in the hopes of finding a game or type of exercise which is especially valuable for general physical development. If this can be accomplished the next step will be to adapt it so that it may meet the requirements for making it profitable as a type to be used throughout life.

Purpose of the Study

This work was undertaken for the purpose of obtaining, if possible, information concerning the growth and development of men while taking the required work in physical education at the University of Nevada. The immediate aim was to learn the effect of different types of activity on the development of different parts of the body.

By the study it was hoped to show significant facts concerning the work which is now included in our curriculum, thereby affording grounds for the discontinuance of some of the courses and possible addition of others.

It seems especially necessary to find a type of exercise that will be of value to all the muscles of the body and at the same time be a challenge to the skill of the performer and have a degree of pleasure and recreation that will insure its continuation after completion of the course.

Method of Collecting Data

Twenty-eight measurements were taken of each man in the Freshman and Sophomore classes before he entered the semester's activity and the same measurements were repeated at the conclusion of the semester or at the end of the season for the sport in which the man participated. As a general rule every man was measured at the beginning of the school year. Measurements were again taken at the end of the first semester and the third measurement was taken at the end of the second semester. Men substituting sports for the regular physical education were measured when their particular sport

season was over. The regular time for taking these measurements and strength tests was in the morning from 7:30 to 8:30 and, except in a few cases where men missed their appointments, all measurements were made at this time of day.

The results were tabulated on a percentile chart and each man was given an opportunity to study his own card. Men were encouraged to do their best in each strength test. Each measurement was made with a conscious effort for exactness and was tabulated by an assistant as it was read by the examiner.

Four rooms were used during the examination. In the first room the cards were secured and the height and weight taken; in the second all measurements requiring the use of the tape measure or caliper; in the third all strength tests; and in the fourth room all endurance tests. The rooms were kept at a comfortable temperature and all measurements and tests were taken only after all clothing had been removed.

Measurements were taken in order, from the head down. The anthropometric spring tape, graduated in tenths, supplied by the Naragansett Machine Company, Providence, R. I., was used. Only a few men were measured with one tape. Tapes were frequently replaced by new ones, and were always discarded after measuring a man with a skin eruption of any nature.

The following measurements and tests were taken in approximately the order given:

- | | |
|-------------------------|----------------------------|
| 1. Height | n. Left thigh |
| 2. Weight | o. Left calf |
| 3. Girths: | 4. Breadth and depth: |
| a. Neck | a. Shoulder breadth |
| b. Chest contracted | b. Hip breadth |
| c. Chest expanded | c. Chest depth contracted |
| d. Chest expansion | d. Chest depth expanded |
| e. Waist | 5. Strengths: |
| f. Right upper arm down | a. Pull up |
| g. Right upper arm up | b. Right forearm |
| h. Right forearm | c. Left forearm |
| i. Left upper arm down | d. Back |
| j. Left upper arm up | e. Legs |
| k. Left forearm | 6. Lung capacity |
| l. Right thigh | 7. Endurance (Meylan test) |
| m. Right calf | |

All men are informed before taking the strength tests that the results in no way affect the grade for the course. This precaution is taken in order to get maximum performance at the first test. Otherwise some would not put forth their best effort in the first test in order to show greater improvement in the next. The conditions surrounding the examinations were made as nearly the same for each test as possible. Practically all measurements with tape and caliper

were made by the same two men. Strength tests were supervised by advanced students familiar with the technique.

The method of taking measurements corresponded closely with instructions given by Dr. J. W. Seaver—"Anthropometric Apparatus with Directions for Measuring."

Number of Measurements

The data used in this study are the result of measurements taken of men, during their Freshman and Sophomore years, over a period of five years. Each man was measured six different times during his first two years of college; three times in the Freshman year and three times in the Sophomore year. Tabulations were made for more than one thousand men, making a total of well over six thousand measurements.

The breadth and depth measurements were made only during the last two years so do not represent all the men considered. Incomplete cards and records of men who withdrew from school during the progress of a course have been eliminated as have been records of all foreign students.

Time Allotment

Mass Games and Calisthenics: This work was given during the Freshman year to all men who had not chosen some form of sport as a substitute. Thus the first semester class contained some men who transferred to basketball, track, or tennis for their second semester's work. In these cases the measurements taken at the end of the first semester were used in this study as the second measurements in mass games and calisthenics, and these measurements were used as the first measurements in the sport they selected for the second semester. Thus the results obtained in considering this exercise were based on a year's work for a majority of the men, but on a half year's work for some.

Mat Work and Tumbling: This constituted the gymnasium work for the first semester of the Sophomore year. Results obtained in this study are based upon one semester's work.

Heavy Apparatus: This work was given during the second semester of the Sophomore year. Therefore the first measurements of this exercise include the second measurements of mat work and tumbling, and of Sophomore football men, who did not play basketball. The results obtained are based upon one semester's participation.

Football: In football both Freshmen and Sophomores started work the last week of August and finished about Thanksgiving time. This makes a total time of approximately two semesters. While some men dropped out of the sport after their Freshman year the

majority continued the sport in their Sophomore year. All men have been included whether they participated one or two years.

Basketball: Men transferred to basketball at the beginning of the second semester in both Freshman and Sophomore years. This sport ended for all in the first week of March. Therefore the study is based on an active participation for approximately two months each year. The two years put together would equal even less than one semester's activity.

Track and Field: This sport covered the second semester's activity in both Freshman and Sophomore years. Consequently the participation time covers two semesters in most cases.

Tennis: This sport was offered during the second semester of Freshman and Sophomore years. For those who selected this sport both years the actual participation time covers two semesters. Many men considered, however, spent only one semester in the sport.

KEY TO THE FOLLOWING TABLE

MGC—Mass Games and Calisthenics.

MWT—Mat Work and Tumbling.

HA—Heavy Apparatus.

FB—Football.

BB—Basketball.

T&F—Track and Field.

TEN—Tennis.

Consolidated Table of Gains and Losses

| | MGC | MWT | HA | FB | BB | T&F | TEN | Unit Meas. |
|-----------------------------|-----|------|------|------|------|------|------|------------|
| <i>Height</i> | .2 | — .1 | — .1 | — .1 | — .2 | — .1 | — .2 | in. |
| <i>Weight</i> | 4 | — 3 | — 0 | — 3 | — 2 | — 2 | — 4 | lbs. |
| <i>Girths:</i> | | | | | | | | |
| Neck | .2 | — .4 | — 0 | — .1 | — .1 | — .2 | — .2 | in. |
| Chest Contracted | .3 | — .2 | — .1 | — .1 | — .8 | — .3 | — .3 | in. |
| Chest Expanded | .4 | — .6 | — .1 | — .2 | — .3 | — .4 | — .3 | in. |
| Chest Expansion | .1 | — .3 | — .2 | — .2 | — .1 | — .1 | — .2 | in. |
| Waist | .5 | — .7 | L .2 | — .5 | L .1 | — .1 | — .4 | in. |
| Rt. Up. Arm down | .2 | — .2 | — .1 | — .1 | — 0 | — .1 | — .2 | in. |
| Rt. Up. Arm up | .1 | — .2 | — .2 | — .1 | — .1 | — .1 | — .2 | in. |
| Rt. Forearm | .1 | — .1 | — .1 | — .1 | — .1 | — 0 | — .2 | in. |
| L. Up. Arm down | .2 | — .7 | — 0 | — .1 | L .1 | — 0 | — .1 | in. |
| L. Up. Arm up | .1 | — .3 | — .1 | — 0 | — .1 | — 0 | — .2 | in. |
| L. Forearm | .1 | — .1 | — .1 | — .1 | — .1 | — 0 | — .1 | in. |
| Right thigh | .4 | — .7 | — .3 | — .5 | — 0 | — .4 | — .4 | in. |
| Right calf | .3 | — .3 | — .1 | — .3 | — .1 | — .3 | — .3 | in. |
| Left thigh | .6 | — .7 | — .1 | — .4 | — 0 | — .3 | — .5 | in. |
| Left calf | .3 | — .3 | — .1 | — .2 | — .1 | — .2 | — .3 | in. |
| <i>Breadths and Depths:</i> | | | | | | | | |
| Shoulder breadth | 0 | — .2 | — .1 | — .1 | — 0 | — .1 | — 0 | in. |
| Hip breadth | .2 | — .2 | — .1 | — .1 | — .1 | — 0 | — .2 | in. |
| Chest depth cont. | 0 | — 0 | — .1 | — 0 | — .1 | — .1 | — 0 | in. |
| Chest depth exp. | .2 | — 0 | — .2 | — .1 | — .1 | — .1 | — .1 | in. |

Strengths:

| | | | | | | | | | | | | | | | |
|---------------------|---------|---|-----|---|----|---|-----|------------------|-----|---|-----|---|-----|---|---------|
| Pull up | .1 | — | .7 | — | .7 | — | .4 | — | .1 | L | .4 | — | .7 | — | times |
| Right Forearm | 8 | — | 4 | — | 4 | — | 5 | — | 4 | — | 4 | — | 6 | — | lbs. |
| Left Forearm | 4 | — | 3 | — | 4 | — | 3 | — | 5 | — | 2 | — | 6 | — | lbs. |
| Back | 15 | — | 21 | — | 1 | — | 18 | — | 2 | — | 4 | — | 3 | — | lbs. |
| Legs | 33 | — | 36 | — | 18 | — | 37 | — | 29 | — | 34 | — | 14 | — | lbs. |
| Lung Capacity | 10 | — | 5 | — | 0 | — | 7 | — | 4 | — | 8 | — | 6 | — | cu. in. |
| Endurance | 3.3 | — | 2.9 | — | 4 | — | 5.4 | — | 5.1 | — | 1.8 | — | 1.2 | — | times |
| | L—Loss. | | | | | | | All others gain. | | | | | | | |

| Measurement | Final Ranking | |
|-----------------------------|---------------|-----------|
| | 1st | 2nd |
| Neck, chest and waist | MWT | BB |
| Arm girths | MWT | TEN |
| Leg girths | MWT | TEN & MGC |
| Breadths and Depths | MWT | MGC |
| Strengths | MWT | TEN |
| Lung Capacity | MGC | T&F |
| Endurance | FB | BB |

Conclusions

1. Mat work and tumbling as body building exercises show greater development than do any others of the seven types studied. This fact seems to contradict the theory that *interest* in the exercise adds to its effectiveness, since it was obvious that the men were more interested in some of the competitive exercises, for example football and basketball, and these did not show much improvement.

2. Tennis is deserving of greater emphasis than is usually given it. In addition to ranking next to mat work and tumbling, this sport has added value in that it may be played successfully from childhood until late in life. The development as shown by the results is evidence that the game calls for vigorous action on the part of all the big muscles of the body. The fact that the left arm increased in size and in strength in almost the same amount as the increase in the right arm is further indication that the sport is valuable for symmetrical development.

3. General calisthenics and mass games have considerable developmental value as well as carry-over possibilities. Since this kind of exercise can be carried on in almost any room and as vigorously as age and physical condition will permit, it is evident that a knowledge of calisthenic exercises can be of considerable benefit to the individual after leaving college. As for mass games the equipment is simple and almost any yard will provide space for interesting and invigorating games.

4. Football, basketball, and track do not appear to influence size in any marked degree. However, the strength improves considerably especially in football. All three sports show a marked increase in endurance as indicated by the Meylan test.

5. Heavy apparatus seems to have more influence on the development of the arms and legs than on other parts of the body. Since

this class comes during the second semester of the Sophomore year the men are somewhat older and more mature to begin with, which fact may be a possible explanation for the increase being slight.

6. The development apparent in some types of exercise and lacking in others cannot be attributed to age alone since those two showing the greatest development came after some types that did not show such results. As examples, mat work and tumbling were given during the first semester of the Sophomore year while tennis was played during the second semester of each year.

7. The greatest development is noted in mat work and tumbling which were given during the first semester of the Sophomore year. Either this is the best form of developmental exercise in our program or men develop more rapidly at this stage. The latter would not hold true in the case of tennis which comes during the second semester of both years, and tennis ranked close to mat work and tumbling in showing results.

8. More mature men develop endurance rather than gain increase in size. This seems to be indicated in the results from football and basketball.

9. Less mature men, somewhat younger in chronological age, appear to develop in size and strength more rapidly than do those who are more mature. This is evidenced by the contrasted results in tennis and football.

10. Indoor work in tumbling showing such marked improvement would lead to the conclusion that the indoor work in the University of Nevada gymnasium is not a handicap.

11. Whether men develop more as Freshmen or during the Sophomore year in such sports as football, basketball, and track has not been determined in this thesis. Such a study could doubtless be made with profit.

12. It seems fair to conclude that gains in size, strength and endurance are valuable to the men since skill and organic efficiency must in a measure depend upon this development. It is on this basis that these seven types of exercise have been rated for value. A study of the development of skills and organic efficiency should possibly be made the basis for another investigation.

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The Case For and Against Intercollegiate Athletics for Women and the Situation Since 1923

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Introduction

Foreword

IN the spring of 1923 the College Women's Section of the Middle West Society of Physical Education asked the writer of this article to present at its program a study of the situation of intercollegiate athletics for women, including the case both "for" and "against" such activities. At that time 50 colleges located in 23 states replied to the questionnaire sent out all over the country and the information gleaned was presented at this program and subsequently to the public, through the channels of various magazines and pamphlets.

During the summer of 1930 the Women's Division, National Amateur Athletic Federation asked that the study be repeated so that it might learn of the tendencies of the past seven years' growth and know the present situation. In response to that request, the following report is submitted.

Source of Information

The writer wishes to thank the large group of women who gave so generously of their time to answer this questionnaire and by so doing made this study possible.

Questionnaires were sent out to the Directors of Physical Education for Women in 154 leading colleges and universities of the United States. Replies were received from 98 colleges. (Only 50 replies were received in 1923.) Fifty-six directors failed to reply. The 98 directors replying represent 37 different states and the District of Columbia. (Only 23 states were represented in the replies of 1923.)

This study includes agricultural colleges, teachers colleges, state universities, privately controlled universities, women's colleges, co-educational colleges, junior colleges, and denominational colleges. It

includes colleges of all sizes, with the enrollment of women students ranging from 52 to 9709.

A study of intramural athletics is not included in this report. It deals only with the problem of intercollegiate athletics or intermurals.

States Represented In This Study

The number before each name represents the number of colleges in each state represented by replies to the questionnaire.

| | | |
|------------------------|------------------|-----------------|
| 1 Arizona | 3 Maine | 1 Pennsylvania |
| 13 California | 1 Maryland | 1 Rhode Island |
| 3 Colorado | 5 Massachusetts | 1 South Dakota |
| 1 Delaware | 3 Michigan | 1 Tennessee |
| 1 District of Columbia | 3 Missouri | 1 Texas |
| 1 Florida | 1 Montana | 1 Utah |
| 3 Georgia | 1 Nebraska | 2 Vermont |
| 1 Idaho | 6 New York | 2 Virginia |
| 3 Illinois | 1 Nevada | 2 Washington |
| 5 Iowa | 2 North Carolina | 1 West Virginia |
| 5 Indiana | 1 North Dakota | 3 Wisconsin |
| 4 Kansas | 10 Ohio | 1 Wyoming |
| 1 Kentucky | 2 Oregon | |

States Not Represented In This Study

Nine states are not represented in this study due to failure of directors to return the questionnaires. Two states are not represented due to an oversight deeply regretted by the writer. The number before each name indicates the number of questionnaires sent to each state.

| | | |
|---------------|-----------------|------------------|
| 1 Alabama | 3 Minnesota | 0 New Mexico |
| 2 Arkansas | 1 Mississippi | 1 Oklahoma |
| 1 Connecticut | 0 New Hampshire | 3 South Carolina |
| 2 Louisiana | 1 New Jersey | |

Colleges Represented In This Study

| | |
|---|---|
| Agnes Scott College, Decatur, Ga. | Duke University, Durham, N. C. |
| Baker University, Baldwin, Kans. | Earlham College, Richmond, Ind. |
| Bates College, Lewiston, Me. | East Tennessee State Teachers College, Johnston City, Tenn. |
| Beloit College, Beloit, Wis. | Florida State College for Women, Tallahassee, Fla. |
| Boston University, Boston, Mass. | Franklin College, Franklin, Ind. |
| Brown University, Providence, R. I. | George Washington University, Washington, D.C. |
| Central State Teachers College, Stevens Point, Wis. | Indiana State Normal School, Terre Haute, Ind. |
| Chico State Teachers College, Chico, Calif. | Indiana University, Bloomington, Ind. |
| Coe College, Cedar Rapids, Iowa. | Iowa State College, Ames, Iowa. |
| Colby College, Waterville, Me. | Kansas State Agricultural College, Manhattan, Kans. |
| College of the Pacific, Stockton, Calif. | Lake Erie College, Painesville, Ohio. |
| College of Wooster, Wooster, Ohio. | Miami University, Oxford, Ohio. |
| Colorado Agricultural College, Ft. Collins, Colo. | Michigan State College, East Lansing, Mich. |
| Colorado College, Colorado Springs, Colo. | Middlebury College, Middlebury, Vt. |
| Cornell College, Mt. Vernon, Iowa. | Mills College, Mills College P. O., Calif. |
| Delaware University, Newark, Del. | |
| DePauw University, Greencastle, Ind. | |
| Drake University, Des Moines, Iowa. | |
| Drexel Institute, Philadelphia, Pa. | |

- Modesto Junior College, Modesto, Calif.
 New York University, Washington Square,
 New York City.
 North Carolina College for Women,
 Greensboro, N.C.
 Oberlin College, Oberlin, Ohio.
 Occidental College, Los Angeles, Calif.
 Ohio Wesleyan University, Delaware, Ohio.
 Oregon State College, Corvallis, Ore.
 Radcliffe College, Cambridge, Mass.
 Riverside Junior College, Riverside, Calif.
 Rockford College, Rockford, Ill.
 Russell Sage College, Troy, N.Y.
 Sacramento Junior College,
 Sacramento, Calif.
 San Jose State Teachers College,
 San Jose, Calif.
 Scripps College, Claremont, Calif.
 Shorter College, Rome, Ga.
 Skidmore College, Saratoga Springs, N.Y.
 Smith College, Northampton, Mass.
 Southwestern College, Winfield, Kans.
 Stanford University, Stanford University
 P. O. Calif.
 Stephens College, Columbia, Mo.
 Sweetbriar College, Sweetbriar, Va.
 Syracuse University, Syracuse, N.Y.
 University of Arizona, Tucson, Ariz.
 University of California, Berkeley, Calif.
 University of Chicago, Chicago, Ill.
 University of Cincinnati, Cincinnati, Ohio.
 University of Colorado, Boulder, Colo.
 University of Georgia, Athens, Ga.
 University of Idaho, Moscow, Idaho.
 University of Illinois, Urbana, Ill.
 University of Iowa, Iowa City, Iowa.
 University of Kansas, Lawrence, Kans.
 University of Kentucky, Lexington, Ky.
 University of Maine, Orono, Me.
 University of Maryland, College Park, Md.
 University of Michigan, Ann Arbor, Mich.
 University of Missouri, Columbia, Mo.
 University of Montana, Missoula, Mont.
 University of Nebraska, Lincoln, Nebr.
 University of Nevada, Reno, Neva.
 University of North Dakota,
 Grand Fork, N. D.
 University of Ohio, Columbus, Ohio.
 University of Oregon, Eugene, Ore.
 University of Redlands, Redlands, Calif.
 University of South Dakota,
 Vermillion, S. D.
 University of Texas, Austin, Texas.
 University of Utah, Salt Lake City, Utah.
 University of Vermont, Burlington, Vt.
 University of Washington, Seattle, Wash.
 University of Wisconsin, Madison, Wis.
 University of Wyoming, Laramie, Wyo.
 Vassar College, Poughkeepsie, N.Y.
 Washington State College, Pullman, Wash.
 Washington University, St. Louis, Mo.
 Wells College, Aurora, N.Y.
 Wellesley College, Wellesley, Mass.
 Western College for Women, Oxford, Ohio.
 Western Reserve University,
 Cleveland, Ohio.
 Western State Teachers College,
 Kalamazoo, Mich.
 Westhampton College, Richmond, Va.
 West Virginia University,
 Morgantown, W. Va.
 Wheaton College, Norton, Mass.
 Whittier College, Whittier, Calif.
 Wittenberg College, Springfield, Ohio.

The Case — For and Against

A. Varsity Type of Intercollegiate Athletic Competition for Women

(Varsity type involves the coming together of the teams of the competing colleges with each team representing its entire college.)

I. EFFECT UPON WOMEN STUDENTS

a. Advantages to those who participate.

1. "In keeping necessary training rules they would acquire habits of hygienic living which should be of great value to them."

2. "Through contact with strangers as their guests or as their hostesses they would acquire a training in social values and a broadening of experience which cannot be approximated in playing games with none but home teams."

3. "Through the greater interest in intercollegiate games they would feel the more keenly defeat and victory so that their instructors would have an opportunity to drive home to them the lessons to be derived from defeat and victory more quickly and more sharply than in the case of intramural or interclass activities!"

4. "They would work harder, thereby acquiring better muscular control, co-ordination and increased vigor, also increased mental activity in quickened thought reactions!"

5. "They would acquire alertness, initiative, clear thinking, decisiveness, self-discipline to a much greater degree than they would through lesser interest in home activities."

6. "They would have opportunities to make contacts they would not otherwise have."

7. "It would give good players a chance to play good games."

8. "It is a wholesome pleasure."

9. "It broadens the vision of the girls."

10. "It creates an excellent test of sportsmanship and health training in order to succeed."

11. "The varsity type of individual needs opponents worthy of her calibre."

12. "It aids women to meet problems of competition in the business and professional world."

13. "It gives the girl with exceptional motor skill an opportunity for development and she should have this chance as well as the girl with the exceptional mind."

14. "It trains girls for later situations in life, physically and socially."

b. Disadvantages to those who participate.

1. "They would be apt to get more 'physical straining than physical training,' showing the most perhaps in nerve fatigue."

2. "The emotional strain attendant upon such competition would be injurious."

3. "There would be ever present the tendency to take an active part in activities during the menstrual period for the sake of the trip and the honor of having played. Also the members of a team who can be the least spared by their team would be urged to keep secret their condition so the team would suffer no handicap through their absence, the desire to play the best players being so much more intense in intercollegiate games than it would ever be in a series of interclass or intramural games."

4. "The intensive training that would come with participation in these activities would lead to the neglect of other school work due to increase of interest in the activity or through physical fatigue from this intensive training, which would make the girl unable to give proper attention to the other work."

5. "The one idea to win at any cost would be bound to creep in, bringing in its wake the inevitable qualities of rowdyism, *unless* the activities and the players themselves are carefully supervised by competent and conscientious instructors."

6. "With the usual rush of college life there is no time that might rightly be given up for the intensive training intercollegiate activities demand."

7. "An undesirable newspaper notoriety would be sure to come to the girls; especially undesirable would be the mention of the fact that certain players are to be out of certain games, as is always the case when men players are out for physical disability of any sort."

8. "The sense of values of the players would become distorted as now happens in the case of men's athletics."

9. "The disadvantages so far outweigh the advantages that we should not even consider them."

10. "Girls are too high strung emotionally to participate wisely in such activities."

11. "The values, if any, when achieved are not worth the time spent to achieve them."

12. "They would make unfavorable contacts through the unfavorable publicity that would come with varsity competition."

13. "It is not a wholesome activity for a girl to enter judging from the experiences college men go through in their varsity competition."

14. "Membership on a varsity squad would curtail a woman's freedom to pursue the normal trend of college life just as it now curtails the freedom of a man who is on a varsity squad."

15. "A question which should not be ignored is that raised by certain members of the medical profession as to the bad effect of intense athletic participation on child bearing."

c. Disadvantages to those who do not participate.

1. "They may not get 'physical straining' but would be quite apt to get little 'physical training' through neglect if the teaching staff had to turn out varsity teams. It seems impossible that the 'many' would not suffer neglect for the 'few.' No school has sufficient staff or equipment to carry out a correct program for both the 'many' and the 'few.'"

2. "The many girls neglected are sure to be the very girls who need the most training for their physical welfare."

3. "They would not have their legitimate share of athletic and department funds spent upon their training, so high would be the expense of intercollegiate teams."

II. EFFECT UPON THE TEACHING STAFF

a. Advantages.

1. "With a keener interest felt by the players in intercollegiate activities than in interclass games, the instructor would be enabled all the more quickly to instill into the girls ideals of true sportsman-

ship, and the more quickly to drive home to them lessons to be learned from defeat and victory."

2. "The incentives to make intensive study of the game and its possibilities would be greater."

b. Disadvantages.

1. "It would limit certain instructors' field of contact to those who would try out for teams, so occupied would be their time with the preparation of varsity teams."

2. "The results of intensive study of the game would reach only the few."

3. "It would seriously curtail their activities in other directions because of the increased time that would be needed for developing school teams."

4. "The work of preparing teams would fall upon the regular teaching staff since it seems improbable and also undesirable that special 'coaches' would be engaged by schools to care for this work and this would of necessity mean the neglect of very important work that should be done for the 'many' in order to carry on this work for the 'few.'"

5. "The increased expense necessary for intercollegiate activities would handicap a department in its work in other and very important directions."

6. "Intramural and interclass activities offer the logical way to interest the vast majority in athletics and they would surely suffer if intercollegiate sports should enter the program."

7. "It breeds a poor type, the 'coach type' who is not 'professionally minded' and does not have the educational attitude toward her work," says a director who speaks from actual experience with intercollegiate competition.

8. "The sense of values of the coaches would become distorted as now happens with coaches of mens' intercollegiate athletics."

III. EFFECT UPON THE ATHLETIC ACTIVITIES THEMSELVES

a. Advantages.

1. "Intercollegiate competition would lead to more intensive study of the technique of the game and its possibilities."

2. "The type of playing demanded of a team prepared for such competition would raise the standards of interclass playing within the school."

3. "It sets an example of skill and thus encourages greater participation in the games."

4. "It gives a better idea of the purposes of sports."

5. "It creates higher standards of performance."

6. "It creates an excellent test of sports."

7. "Mass participation levels the best to mediocrity and unless other opportunity is given to the best, the best is lost."

8. "With proper coaching and officiating, intercollegiate athletic competition gives greater opportunity for fairer and more stimulating competition."

b. Disadvantages.

1. It would prevent the adaptation of the game to meet the needs of the average girl since the more intense interest would be in the game the stronger girl could play."

2. "It would limit the number actually playing the game since only a few can be chosen for teams."

3. "It would tend to produce 'fans' out of the majority, rather than players."

4. "It would lessen the field of interest in the activity through a lessening of the number that can be chosen."

5. "The highly undesirable commercialism of men's athletics would be sure to creep in."

6. "It would tend towards professionalism, a most undesirable thing."

7. "It would produce enemies for the game because of disapproval of the physical strain upon the participants."

8. "The entrance of women into the intercollegiate athletic world would take us still farther away from the goal physical educators seek—the goal of 'play for play's sake' and everyone on the field instead of in the grandstand."

9. "It would be sure to be conducted as is men's inter-collegiate athletic competition. Why do we think it would not be so conducted since there are so many men only too willing to step in and advise in that direction?"

10. "Even if it got started in an approved way, the situation would be sure to run away with itself and the whole thing would become like men's intercollegiate athletics—a highly undesirable thing."

11. "Athletic competition between colleges as it now exists in the field of men's athletics is unwholesome and a waste of time and energy. Why involve women in the same thing?"

12. "Intercollegiate athletics and strong general participation of students are incompatible."

13. "The college girl actually would not be interested in sports to the extent needed to carry on a successful intercollegiate program. Her interests can be sufficiently served in an intramural program."

14. "My experience at ——— University teaches me that girls can be interested in large numbers in an intramural program without varsity competition to make a peak to the pyramid at the end of each

season. We have been doubling and even tripling our intramural enrollment in many sports year by year for four years now, with the plea to come out 'just for the fun of it' as the only incentive. I am sure the majority of these girls would not come out for these sports if they thought it meant working up to varsity for they would not care to go into it so intensively. Many would feel they should not come out unless they were skillful at a sport if varsity play were the ultimate goal of the season and so we would lose the very girls we need most to reach. The appeal to come out 'just for the fun of it' reaches hundreds of girls the minute they know it is not to be intensive and is to be purely recreational."

15. "While a few girls on every campus may yearn for the notoriety varsity playing might bring them, the great rank and file of women students would greatly dislike being personally involved in the tedious work and physical straining of a varsity program. They wish for themselves play and fun from their physical activities, not the work and tedious confinement they see their brothers go through who are on a varsity squad. There are plenty of men students too who see these disadvantages in varsity participation and avoid being dragged into it personally. The epidemic of student opinion voiced in our college papers all over the country last fall (1930) will back up these statements."

IV. EFFECT UPON THE COLLEGES SO INVOLVED

a. Advantages.

1. "It would create a greater interest in the school's athletics on the part of the outside world."
2. "It would create a greater interest among the students."
3. "It hastens intercollegiate friendliness."
4. "It gives colleges a chance to know each other."
5. "It gives an increased respect for other colleges."
6. "It gives a broader perspective and criticism of one's own college as compared with other colleges."

b. Disadvantages.

1. Quoting one of the leading physical directors for women of the Middle West: "Men's athletic departments are struggling now with their difficult situation and are not as yet making much progress. In the present unhealthful state of public and alumni opinion, intercollegiate athletics for women would be subjected to the same pressure from the outside as are men's, i.e., to make the game a good spectacle, to have a highly specialized team, so that it would be worth paying to go to see, and very likely, worth betting on."

2. "The handling of gate receipts and other business aspects of intercollegiate competition would tend to develop the director into a business manager rather than an educational expert."

3. "The gate receipts themselves would tend to develop extravagance in the department and the tendency to expend a disproportionate amount of money for the training of the few who earn the gate receipts."

4. "It would mean a reorganization of the physical education staff as well as its class work so that the intercollegiate squad could be trained separately, questions of eligibility could be passed upon and other intercollegiate matters could be properly dealt with."

5. "The desire to produce a winning team would tend to make students and faculty alike forget that the game should serve as a recreation for its participants as well as for the spectators. It is already a criticism of men's athletics by English observers that they take them too seriously and magnify their importance, forgetting on the other hand, the spirit of 'play for play's sake.'"

6. Quoting a prominent eastern director: "Most of us constantly see ways in which we could do more follow-up work, check up our procedures by more careful records and more study of those that we do keep, see ways of adapting work more carefully to individual needs, of stimulating intelligent effort in posture correction, in health habits, etc. Many of us are compelled to teach larger classes than permit of real instruction because we have not the floors or the staff to permit of organizing more classes. Attention to intensive competition would curtail the development of our departments in what to me seem more essential directions."

7. "My experience at———College where 400 students take part in the preliminary competitions and 200 compete on field day, and where Juniors and Seniors whose sport is entirely voluntary place a team in each of eight different sports on the field has intensified my belief that a general interest can best be obtained *without* intercollegiate competition. Our thirty-two different teams in the eight sports bring out this large number because no girl is a member of more than one team."

8. "It would be forcing something we are not properly organized to carry on."

9. "Our intramural program reaching over 2,000 women in a year's round of physical activities at———University would be sure to suffer if we were to organize for intercollegiate competition with its demand for winning teams. This would necessitate the giving of extreme attention to a mere handful of women and this in turn would call for failure of attention to these 2,000 and their activities, as things are now organized in our university and as they

will probably be organized until the millennium comes due to the ever present shortage in staff and facilities."

B. Interclass Type of Intercollegiate Athletic Competition for Women

(Interclass type involves the coming together of teams from competing colleges, each team representing only a class of its college and competing against a team of the same class of the competitor college.)

I. EFFECT UPON THE PARTICIPANTS

a. Advantages.

1. "It gives the skilled players an opportunity not found in intramurals alone, yet at the same time would not have the physical and nervous strain of varsity competition."

2. "It gives the advantages of social and extensive participation without the disadvantages of varsity type provided the colleges participating are near each other."

3. "If carried on it would involve more of the masses than does the varsity type."

b. Disadvantages.

1. "All disadvantages of varsity type are involved in this type."

2. "It is as bad as varsity type because it involves absence from studies, travel, fatigue, etc."

3. "It is accompanied by nerve strain and stress just as is varsity type."

4. "It would involve too much of the time and energy of the staff as well as of the girls."

II. EFFECT UPON THE ACTIVITIES

a. Advantages.

1. "It takes away the undesirable emphasis of varsity upon one team and a few stars."

2. "It is devoid of the disadvantages of varsity type, yet better than play days with mixed and spontaneous teams, which are unsatisfactory to players."

3. "It favors the highly organized sports that suffer in a play day with mixed teams yet avoids varsity evils."

4. "It has more possibility of ideal conditions than does the varsity type."

5. "It gives a better form of competition than does varsity type since it is organized by age and amount of training of the girls."

6. "It is a natural outgrowth of interclass intramurals while varsity type is not."

7. "It seems to be a neutral ground between 2 extremes and it might contain the better features of each if guarded and well organized."

8. "It has more of the play spirit than does varsity type and less of stress and tension."

b. Disadvantages.

1. "It places an over-emphasis on athletics."
2. "It multiplies all the evils of varsity type by four since it involves four teams instead of only one."
3. "Better results can be obtained through play days and intramurals and sponsoring this type would interfere with the other."
4. "Colleges near enough to each other for such competition are too unevenly matched in numbers to select teams from, thereby making unbalanced competition."
5. "There is plenty of opportunity for healthful competition on one's own campus, so why any intercollegiate type of athletics at all?"
6. "It is a non-essential to a good physical education program."
7. "It is an impractical thing to sponsor."
8. "It would mean neglect of the mass of girls needing attention in way of physical education."

C. Telegraphic Type of Intercollegiate Athletic Competition

(A varsity team of one college competing against a varsity team of another college but each playing off matches on own campus and comparing scores by telegraph.)

I. EFFECTS UPON THE PARTICIPANTS

a. Advantages.

1. "It surely is not harmful but what advantages are there?"

b. Disadvantages.

1. "There is no social carry over."
2. "The joy of good play is not sufficiently awarded by a telegram."
3. "It involves as much strain to break records in the case of track and field and swimming as does varsity type and therefore is just as undesirable."

II. EFFECT UPON THE ACTIVITIES

a. Advantages.

1. "It has the advantage of giving competition against other colleges without the disadvantage of the other types."
2. "It gives added interest to activities involved."

b. Disadvantages.

1. "In telegraphic swimming meets the timers, starters, conditions of pools, etc., are different for each, so results are not comparable."

2. "In telegraphic track meets, the wind, condition of the track, atmosphere, officials are all different for each college, so the results are not comparable."

3. "In golf telegraphic meets, the courses are of different length and of varying difficulty for each college so that the comparison of scores really means nothing."

4. "Why bother with this when we do not need this added incentive to increase interest in these activities?"

D. Play Days or Sports Days

(This day devoted to the coming together of groups of girls from competing colleges but all redivided into new teams, no team representing any one college, each team representing a combination of all colleges involved, with a variety of athletic activities engaged in during the day.)

I. ORGANIZED FOR PLAYING OF COLLEGE VS. COLLEGE.

a. Advantages.

1. "It would give more satisfaction in team skills but should be organized as class team vs. class team and not as varsity form."

2. "It would result in better games and therefore more interesting games."

3. "Play Days would be more satisfactory to the largest number if college teams were kept intact but to avoid varsity intercollegiate athletic evils and to retain play spirit, there should be many teams from each college in action."

4. "This would be quite wholesome if kept informal and impromptu and free from spectators."

5. "This might be approved if the colleges did not know ahead of time what sports were to be on the program and so would enter a large number of girls prepared to enter any sport. This would eliminate any opportunity for intensive practice for the occasion which is one of the greatest evils of intercollegiate athletics. Under these circumstances, and if the play day is arranged with elimination of absence from classes, might college vs. college play be approved and then only."

6. "This is a more natural form of competition than that with mixed groups and it eliminates disadvantage of varsity athletics."

7. "It would permit development of carry over skills as mixed group playing does not."

8. "It permits girls to enjoy more the technique of playing which is of greater interest to them after 19 years of age than is the playing with other people."

9. "It gives more interest to a play day than does mixed group playing."

b. Disadvantages.

1. "It offers the danger of retarding the progress of spontaneous play spirit which is already made."

2. "It would inspire a spirit of school against school rather than inspire the pleasure of playing side by side with other schools."

3. "It would spoil the play spirit of Play Day."

4. "It would start the old bug bear of intercollegiate athletics."

5. "Why not play for the sake of the sport alone?"

6. "We are not ready for games as college vs. college in even this form yet."

7. "School vs. school in a Play Day would be highly undesirable at the high school age level even though it might be approved for college age and since high schools ape colleges as they do, this form of competition should not be engaged in by colleges for the sake of the standards they set."

8. "High schools would read into this an approval of intercollegiate athletics of even the varsity type. They would not distinguish between the two and would be influenced towards a most undesirable form of their own interscholastic athletics."

9. "It would lead to coaching to win."

10. "It should not be engaged in simply because it is not the Play Day idea."

11. "It would rob the girls of the opportunity to play for the spirit of play which comes through playing in mixed groups." The girls appreciate this as was evidenced in one Play Day when they were given the preference of play in mixed groups or as college vs. college and they chose the former.

12. "It would still further add to the 'rah rah fanaticism' already existent, and the spirit of play in mixed groups is needed to combat this."

13. "College groups that meet together in Play Days are not as a rule equal in strength and the playing is more even and therefore better and more interesting if the players from all colleges are mixed together."

14. "It would detract from the social values of Play Day."

15. "There will be a better play spirit and more fun for all if groups are mixed from all colleges present."

16. "It would rob Play Days of their most valuable asset—the good training for girls that comes through being put on their mettle by being forced to play against their own college chums and to give allegiance to strangers, instead."

17. "It would foster rivalry rather than friendliness."

18. "It is merely an evasion of responsibility of sponsoring intercollegiate athletics."

19. "It would be an entering wedge for intercollegiate athletics and therefore questionable."

20. "Social interests would not be served for the best as they are served in a Play Day with mixed and spontaneous play. Then the girls from the different colleges get acquainted better and more readily if they play together rather than against each other."

21. "In all our play days, there has never been mention of names of colleges. 'Play for play's sake' has been uppermost in the minds of all and may we never have any other thought."

II. CIRCUMSTANCES UNDER WHICH PLAY DAY GAMES MIGHT BE ACCEPTABLE AS COLLEGE VS. COLLEGE.

1. "If there is mass participation."
2. "If individual sports are the only ones used such as tennis, golf, archery, etc., eliminating jumping contests."
3. "If no championships are settled."
4. "If games are absolutely impromptu and informal."
5. "If with only nearby schools."
6. "If there is no publicity and no gate receipts."
7. "If the game is emphasized and not the victory."
8. "If all emphasis is placed on the social."
9. "If no coaching is allowed, not even between halves of games and with many games going on at a time."
10. "If there is no announcement of scores."
11. "If there is proper coaching and officiating and freedom of coaches to stop a game with any college at any time in a game."
12. "If there is no preliminary practice."
13. "If it is interclass or intergroup college competition and not varsity form."
14. "If there is a limit to the number of sports a girl may enter."
15. "If there are no championships and there is free discussion of play after the games."
16. "If basket ball is eliminated."

E. Why Directors Have Changed Their Views on the Question of Intercollegiate Athletics for Women

I. CHANGE FROM DISAPPROVAL TO APPROVAL

1. "Because there are more women coaches now, the rules are more unified and the public attitude is better." (This director is not having intercollegiate athletics however.)

2. "Sport conditions have changed, they are less emotionalized and games are not now over emphasized."

3. "Because of my experience with Play Days and because of the benefits derived from an extensive intramural program."

4. "Because I have had practical experience with intercollegiate athletics and have found none of the evils which I had drummed into me as a student."

5. "Because I believed without trying it out that intercollegiate athletics meant sports for the few with only the best participating. I find I was wrong. With an increasing intercollegiate program we have had an enormous increase in intramural and non-competitive sports.—Our varsity teams constitute a leader's group which coaches, captains and officiates for the lower teams. I doubt if the group would have the same incentive to meet for instruction, if they did not know that they were going to have their own matches as well as teach others, train teams and umpire games."

II. CHANGE FROM APPROVAL TO DISAPPROVAL

1. "Because of my observation of intercollegiate athletics and discussions of the problem."

2. "Because of the changing attitude toward play and physical education on the part of students and colleges."

3. "Because of my special training in the field of physical education."

4. "Because of my experience with intercollegiate athletics."

5. "Because of my observation of the great needs for training in sports of those who are inexperienced."

6. "Because I felt a stand 'for' was too radical."

7. "Because of an acquired interest in a concern for the effects of athletics on the body."

8. "Because of the changed attitude toward women in sports."

9. "Because of a more sincere study and closer observation. Such participation will not injure some girls—I do not believe it hurt me, but there are girls who played with me who are injured. If *one girl* is injured it doesn't pay."

10. "Because of National Amateur Athletic Federation's views."

11. "My original opinion was based upon the fact that I was a member of a varsity team. Since then the theory and practice of interclass and play day competition have shown themselves far more democratic."

12. "I am now against intercollegiate athletics in all sports of body contact but not against intercollegiate athletic sports such as tennis and golf."

13. "Because within the past eight years I have become a teacher and I see the teacher's viewpoint now."

14. "Because of my observation of intercollegiate athletic games and because of articles I have read on this question."

F. Why two Colleges are Giving up Intercollegiate Athletics for Women this Year

1. "No teams are available near and it is too expensive to travel far. Also we want to involve a larger number in athletics and we can not do this if we have to coach a varsity team." (This director still stands "for" intercollegiate athletics, however, although the President of the college is "against.")

2. "The director is 'against' and is using all of her influence to do away with intercollegiate athletics."

G. Opposition Outside the Department of Physical Education for Women

It is felt by directors that opposition to intercollegiate athletics for women would come with the greatest force from the deans of women followed closely by the college presidents. The college deans are given third ranking in this opposition followed closely by the faculties as a whole. Fifth and sixth places are assigned to the regents and medical officers respectively, while the following groups are listed each by one director as being opposed: the student body, the Home Economics Department, the Department of Physical Education for Men, the Athletic Commission, the Alumni Association, the senior members of the faculty and the Dean of the Physical Education School.

H. Stand of Athletic Conference of American College Women on the Question of Intercollegiate Athletics for Women

At the 6th National Conference of A.C.A.C.W. held at the University of Michigan April 24-26, 1930, 117 colleges were represented at the meeting. The problem of intercollegiate sports was one of the many discussed on the program. In spite of the fact that there was a feeling that intercollegiate competition is gaining in favor, the conference as a whole renewed its former pledges against such competition and passed the resolution that "A.C.A.C.W. oppose all intercollegiate competition, meaning competition in which whole teams from one college compete against whole teams from another college." The organization came out in favor of sponsoring Play Days for both colleges and high schools and in its platform asks that all colleges emphasize mass participation in sports through intramural programs and Sports Days. Notable among its resolutions is the one stating "That A.C.A.C.W. oppose participation in the Olympics by all women." All readers not informed about this organization will be interested to know that it is a group of college women students and not a group of college physical education directors.

Statistics

A. Intercollegiate Athletics for Women

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| I. Participation | | | | |
| a. Number of colleges participating | 11 | 22 | 12 | 12+ |
| 1. Of these, number in varsity type | 6 | | 11 | |
| 2. Of these, number in interclass intercollegiate type | 5 | | 3 | |
| 3. Of these, number in both types | 0 | | 2 | |
| 4. Of these, number in varsity only | 6 | | 9 | |
| 5. Of these, number in interclass intercollegi- ate only | 5 | | 1 | |
| b. Number of colleges not participating | 39 | 78 | 86 | 87+ |
| | 50 | 100 | 98 | 100 |

II, 'For' or 'against' varsity form of intercollegiate athletics for women.

| | | | | |
|---|----|-----|----|-----|
| a. 'For' | 2 | 4 | 16 | 16+ |
| 1. Of these having it now | 1 | | 9 | |
| 2. Of these not having it now ¹ | 1 | | 7 | |
| 3. Ardently 'for' | 2 | 100 | 3 | 18+ |
| (a) Having it now | 1 | | 3 | |
| (b) Not having it now | 1 | | 0 | |
| b. 'Against' | 43 | 86 | 78 | 79+ |
| 1. Of those having it now ² | 2 | | 2 | |
| 2. Of these not having it now | 41 | | 76 | |
| 3. Ardently 'against' | | | 51 | 65+ |
| (a) Of these 51, having it now | | | 1 | |
| (b) Of these 51, not having it now | | | 50 | |
| (c) Of these 51, number who were also against 8 years ago | | | 38 | 74+ |
| (d) Of these 51, number who have changed opinion in last 8 years and all from ap- proval to disapproval | | | 13 | 25+ |
| c. 'In doubt' on question ³ | 4 | 8 | 1 | 1+ |
| d. Unclassed because of conflicting replies | 1 | 2 | 3 | 3+ |
| | 50 | 100 | 98 | 100 |

¹ Of the 16 directors of 1930 "for," only 9 state "out and out" approval. Of the other 7, 6 are "for" but with reservations, while the seventh gives no information on this point. The reservations are as follows: "If the competition is invitational only," "if the competition is well supervised," "if well guarded," "if worked up only through an intramural program and engaged in only once or twice a year and then only on the most friendly terms."

² Of the seven directors of 1930 "for" who do not now promote an intercollegiate program, two are directors in state universities, two are directors in privately controlled universities, two are in women's colleges and one is in a coeducational church college.

³ Of the 78 of 1930 against intercollegiate athletics for women, one would approve if it could be properly controlled but as things are, she votes against it. One would approve only on the grounds that it would give the students an interest without their college walls but taking all in all is against. One would approve "never, under no circumstances."

⁴ One of two directors of 1923, soon afterwards eliminated intercollegiate athletics from her college. One of the two directors of 1930 having intercollegiate athletics yet disappearing, is eliminating intercollegiate athletics from her college after 1930.

⁵ The one director of 1930 who is in doubt as to her stand on the question reports that she would approve if it could be carried on in a Play Day atmosphere and spirit but she doubts if varsity intercollegiate athletics and Play Day spirit really ever would go hand in hand.

| | | —1923— | | —1930— | |
|---|-------|-------------|-------------|-------------|-------------|
| | | Num- ber | Per Cent | Num- ber | Per Cent |
| <i>III. Do intercollegiate athletics for women harm participants?</i> | | | | | |
| a. Physically | | | | | |
| 1. Yes | ..... | 30 | 60 | 52 | 53+ |
| 2. No | ..... | 6 | 12 | 31 | 31+ |
| (a) Of these, number having such activities | ..... | 3 | | 11 | |
| (b) Of these, number who disapprove on other grounds | ..... | 1 | | 13 | |
| (c) Of these, number who believe they neither harm nor benefit | ..... | 2 | | 4 | |
| (d) Of these, number who believe they do not harm but do benefit | ..... | 0 | | 3 | |
| 3. In doubt | ..... | 2 | 4 | 6 | 6+ |
| 4. No reply on this | ..... | 12 | 20 | 9 | 9+ |
| | | 50 | 100 | 98 | 100 |
| <i>IV. Do intercollegiate athletics for women benefit participants?</i> | | | | | |
| a. Physically | | | | | |
| 1. Yes | ..... | 12 | 24 | 10 | 10+ |
| 2. No | ..... | 24 | 40 | 76 | 77+ |
| 3. In doubt | ..... | 2 | 4 | 2 | 2+ |
| 4. No reply to this | ..... | 12 | 24 | 10 | 10+ |
| | | 50 | 100 | 98 | 100 |
| b. Socially | | | | | |
| 1. Yes | ..... | 21 | 42 | 39 | 39+ |
| 2. No | ..... | 14 | 28 | 43 | 43+ |
| 3. In doubt | ..... | 5 | 10 | 7 | 7+ |
| 4. No reply to this | ..... | 10 | 20 | 9 | 9+ |
| | | 50 | 100 | 98 | 100 |
| <i>V. Is the majority neglected for the few?</i> | | | | | |
| a. Yes | ..... |  |  | 29 | 29+ |
| 1. Of these, the number having intercollegiate athletics | ..... |  |  | 2 | |
| 2. Of these, the number approving of intercollegiate athletics | ..... |  |  | 5 | |
| b. No | ..... |  |  | 12 | 12+ |
| 1. Of these, the number having intercollegiate athletics | ..... |  |  | 7 | |
| 2. Of these, the number approving intercollegiate athletics | ..... |  |  | 9 | |
| c. Number of directors not answering | ..... |  |  | 57 | 58+ |
| | | | | 98 | 100 |

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| <i>VI. Basis of opinion 'for' or 'against' intercollegiate athletics—varsity type.</i> | | | | |
| a. Number who are now involved in varsity type | | | 11 | 11+ |
| 1. Of these, 'against' | | | 1 | 9+ |
| 2. Of these, 'for' | | | 10 | 90+ |
| b. Number who have had actual experience with this activity as teachers | | | 39 | 39+ |
| 1. Of these, 'against' | | | 26 | 66+ |
| 2. Of these, 'for' | | | 11 | 28+ |
| 3. Of these, unclassified | | | 2 | 5+ |
| c. Number who have had actual experience as teachers of such but are not now involved in them | | | 28 | 28+ |
| 1. Of these, 'against' | | | 25 | 89+ |
| 2. Of these, 'for' | | | 3 | 10+ |
| d. Number who have had actual experience in varsity intercollegiate athletics as students..... | | | 26 | 26+ |
| 1. Of these, 'against' | | | 17 | 65+ |
| 2. Of these, 'for' | | | 8 | 30+ |
| 3. Of these, 'in doubt' about it | | | 1 | 4+ |
| e. Number who have had actual experience with this form of activity <i>either as students or as teachers of students involved</i> | 30 | 60 | 52 | 53+ |
| 1. Of these, 'against' | 28 | 93+ | 38 | 73+ |
| 2. Of these, 'for' | 2 | 6+ | 13 | 25+ |
| 3. Of these, unclassified | 0 | | 1 | |
| f. Number who have observed this form of activity carried on by others but have had no actual experience otherwise | 8 | 16 | 25 | 25+ |
| 1. Of these, 'against' | | | 24 | 96 |
| 2. Of these, 'for' | | | 1 | 4 |
| g. Number who have been involved in this activity as teachers and also have observed others but have not themselves been participants as students | | | 14 | 14+ |
| 1. Of these, 'against' | | | 13 | 92+ |
| 2. Of these, 'for' | | | 1 | 7+ |
| h. Number who have been involved as student participants and observers but not as teachers..... | | | 9 | 9+ |
| 1. Of these, 'against' | | | 9 | 100 |
| 2. Of these, 'for' | | | 0 | |
| i. Number who know of this form of activity from theory only | 7 | 14 | 13 | 13+ |
| 1. Of these, 'against' | 7 | | 12 | 92+ |
| 2. Of these, 'for' | 0 | | 1 | 7+ |
| j. Number not replying to these questions..... | | | 4 | 4+ |
| <i>VII. Holding same opinion 'for' or 'against' varsity type of intercollegiate athletics for women.</i> | | | | |
| a. Number who now hold the same opinion they held eight years ago | | | 65 | 66+ |
| 1. Of these, 'against' then and now | | | 57 | 87+ |
| 2. Of these, 'for' then and now..... | | | 6 | 9+ |

| | —1923— | | —1930— | |
|--|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| 3. Of these, 'in doubt' or 'unclassified' then and now | | | 2 | 3+ |
| b. Number who do not hold the same opinion they held eight years ago | | | 29 | 29+ |
| 1. Of these, 'against' now | | | 22 | 75+ |
| 2. Of these, 'for' now | | | 5 | 17+ |
| 3. Of these, 'in doubt' now | | | 2 | 6+ |
| c. Number who failed to reply to this question.... | | | 4 | 4+ |
| | — | — | 98 | 100 |

VIII. *Change of opinion 'for' or 'against' varsity type of intercollegiate athletics for women.*

| | | |
|---|----|-----|
| a. Number who changed 6 to 8 years ago | 14 | 46+ |
| 1. Of these, 'against' now | 11 | 78+ |
| 2. Of these, 'for' now | 1 | 7+ |
| 3. Of these, 'in doubt' or 'unclassified' | 2 | 14+ |
| b. Number who changed 4 to 6 years ago | 8 | 28+ |
| 1. Of these, 'against' now | 5 | 62+ |
| 2. Of these, 'for' | 2 | 25 |
| 3. Of these, 'in doubt' | 1 | 12+ |
| c. Number who changed from 2 to 4 years ago... | 6 | 21+ |
| 1. Of these, 'against' now | 4 | 66+ |
| 2. Of these, 'for' now | 2 | 33+ |
| d. Number who changed from 1 to 2 years ago ... | 1 | 3+ |
| 1. Of these, 'against' now | 1 | 100 |
| 2. Of these, 'for' now | 0 | |
| | — | — |
| | 29 | 100 |
| e. 'Against' varsity type of intercollegiate athletics for women | 75 | |
| 1. Number who held the same opinion 8 years ago | 52 | 71+ |
| 2. Number who have changed opinion of approval to one of disapproval in past 6 years | 11 | 13+ |
| 3. Changed in past 4 years | 5 | 6+ |
| 4. Changed in past 2 years | 4 | 5+ |
| 5. Changed in past 1 year | 1 | 1+ |
| 6. Number who are against but did not reply as to whether opinion had changed within past years | 2 | 2+ |
| | — | — |
| | 75 | 100 |
| f. 'For' varsity type of intercollegiate athletics for women | 16 | |
| 1. Number who held same opinion 8 years ago | 10 | 64+ |
| 2. Number who have changed opinion from one of disapproval to one of approval in past 6 years | 2 | 11+ |
| 3. Changed in past 4 years | 2 | 11+ |
| 4. Changed in past 2 years | 2 | 11+ |
| | — | — |
| | 16 | 100 |

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| <i>IX. Views of staff members of departments of physical education for women in colleges</i> | | | | |
| a. Number of physical education teachers represented by those directors who reported the number on their staffs and who at the same time replied to questions in such a way that their staff members could be classed as 'for' or 'against'.. | | | 369 | |
| 1. Of these, number 'against' varsity type of athletics for women | | | 315 | 85 |
| 2. Of these, number 'for' varsity type of athletics for women | | | 54 | 14 |
| b. Number of physical education teachers represented by directors who reported that their entire staffs agree with them on the question..... | | | 279 | |
| 1. Of these, number 'against' varsity type of athletics for women | | | 261 | 93 |
| 2. Of these, number 'for' varsity type of athletics for women | | | 18 | 6 |
| <i>X. Views of directors and staff members in colleges supervising the athletics of large numbers of women.</i> | | | | |
| a. Of these 98 colleges represented, the number of college directors having women physical education staffs of 7 or more members..... | | | 17 | 17 |
| 1. Of these colleges, number of directors 'against' | | | 17 | 100 |
| 2. Of these colleges, number of directors 'for' | | | 0 | |
| b. Of these 17 colleges, the total number of physical education teachers whose directors' replies were such that they could be classed as either 'for' or 'against' | | | 150 | |
| 1. Of these, the number 'against' | | | 142 | 94 |
| 2. Of these, the number 'for' | | | 8 | 5 |
| <i>XI. Views of women's athletic associations</i> | | | | |
| a. As compared with views of directors | | | | |
| 1. Number of W.A.A.'s holding same views as their directors | 32 | 64 | 76 | 77+ |
| (a) Of these 'against' | 26 | 81+ | 66 | 86+ |
| (b) Of these 'for' | 2 | 15+ | 10 | 13+ |
| (c) Of these, 'unclassified' | 4 | 6+ | 0 | |
| 2. Number of W.A.A.'s opposing the views of their directors | 6 | 12 | 11 | 11+ |
| (a) Of these against while directors are 'for' 0 | | | 3 | 27+ |
| (b) Of these 'for' while directors are 'against' | 6 | 100 | 6 | 54+ |
| (c) Of these 'against' while directors are 'unclassified' | 0 | | 2 | 18+ |
| 3. Number of colleges where W.A.A. is divided in support of directors' views. | 5 | 10 | 0 | 0 |
| 4. Number of colleges with W.A.A. not classed either as 'for' or 'against' | 7 | 14 | 11 | 11+ |
| | 50 | 100 | 98 | 100 |

| | | —1923— | | —1930— | |
|---|----|-------------|-------------|-------------|-------------|
| | | Num- ber | Per Cent | Num- ber | Per Cent |
| b. As 'for' or 'against' varsity type. | | | | | |
| 1. 'Against' | 26 | 52 | 71 | 72+ | |
| 2. 'For' | 8 | 16 | 16 | 16+ | |
| 3. 'Unclassed' | 16 | 32 | 11 | 11+ | |
| | 50 | 100 | 98 | 100 | |
| c. As compared with views of majority of women students. | | | | | |
| 1. Number of colleges where W.A.A. and majority of women students agree on question 28 | 56 | 83 | 84+ | | |
| (a) Of these, 'against' intercollegiate athletics | | 66 | | | |
| (1) Of these, directors also are 'against' | | 60 | 90+ | | |
| (2) Of these, directors are 'for' but all others 'against' | | 2 | 3+ | | |
| (3) Of these, directors 'in doubt' or 'unclassified,' but all others are 'against' | | 4 | 6+ | | |
| (b) Of these, 'for' intercollegiate athletics | | 14 | | | |
| (1) Of these, directors 'against' | | 3 | 21+ | | |
| (2) Of these, directors as well as others are 'for' | | 11 | 78+ | | |
| (c) Of these number of W.A.A.'s 'unclassified' | | 3 | | | |
| 2. Number where W.A.A. and majority of women students disagree | 2 | 4 | 5 | 5+ | |
| (a) Of these, number where W.A.A. and director both are 'against' but majority 'for' | 2 | 100 | 3 | 60 | |
| (b) Of these, number where W.A.A. and director are 'for' and majority are 'against' | 0 | | 1 | 20 | |
| (c) Of these, number where W.A.A. is 'unclassified' | 0 | | 1 | 20 | |
| 3. Number unclassified | 20 | 40 | 10 | 10+ | |
| | 50 | 100 | 98 | 100 | |
| d. As compared with views of majority of women students and departments of physical education | | | | | |
| 1. Number of colleges where W.A.A., majority of women and Department of P. E. all three agree. | 23 | 46 | 69 | 70+ | |
| (a) Of these 'against' | 18 | 78 | 60 | 86+ | |
| (b) Of these 'for' | 2 | 8+ | 9 | 13+ | |
| (c) Of these 'unclassified' | 3 | 13+ | 0 | | |
| 2. Number of colleges where all three groups do not agree | | | 19 | 19+ | |
| (a) Of these, directors are 'against' but W.A.A. and majority, 'for' | | | 5 | 26+ | |
| (b) Of these, directors are 'for' but W.A.A. and majority are 'against' | | | 3 | 15+ | |

| | —1923— | | —1930— | |
|--|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| (c) Of these, directors are 'in doubt' or 'unclassified' but W.A.A. and majority are 'against' | | | 4 | 21+ |
| (d) Of these, majority of women students are 'for' but W.A.A. 'against' | | | 3 | 15+ |
| (e) Disagreeing but unclassified..... | | | 4 | 21+ |
| 3. Number of colleges not answering | | | 10 | 10+ |
| | <hr/> | | <hr/> | <hr/> |
| | | | 98 | 100 |
| e. As compared with views of a small group of women students. | | | | |
| 1. Number of colleges where small number of women students oppose stand of W.A.A. ... | | | 35 | 35+ |
| (a) Of these, W.A.A. is 'against' and small group 'for' | | | 30 | 85+ |
| (1) Of these, number of directors who side with W.A.A. | | | 30 | 100 |
| (2) Of these, number of directors who side against W.A.A. | | | 0 | |
| (b) Of these, W. A. A. is 'for' and small group 'against' | | | 5 | 14+ |
| (1) Of these, number of directors who side with W.A.A. and against group | | | 2 | 40 |
| (2) Of these, number of directors who are against W.A.A. and with group | | | 3 | 60 |
| 2. Number of colleges not answering this | | | 38 | 38+ |
| 3. Number of colleges where all agree | | | 25 | 25+ |
| | <hr/> | | <hr/> | <hr/> |
| | | | 98 | 100 |

XII. College women represented in this study.

| | | |
|--|---------|-------|
| a. Number of women students represented by these 98 directors' | 120,725 | |
| 1. Of these, the number represented by directors 'against' | 102,791 | 85+ |
| 2. Of these, the number represented by directors 'for' | 13,268 | 10+ |
| 3. Of these, the number represented by directors 'in doubt' | 451 | .03 |
| 4. Of these, the number represented by directors 'unclassified' | 4,215 | 3+ |
| | <hr/> | <hr/> |
| | 120,725 | 100 |
| b. Number represented by schools having varsity type of intercollegiate athletics for women. | | |
| 1. Yes | 8,658 | 7+ |
| 2. No | 112,067 | 92+ |
| c. Number represented by schools having interclass type of intercollegiate athletics for women | | |
| 1. Yes | 1,719 | 1+ |
| 2. No | 119,006 | 98 |

* These figures were procured from Official Bulletin No. 38 of the United States Department of Interior.

| | | —1923— | | —1930— | |
|----|---|-------------|-------------|-------------|-------------|
| | | Num- ber | Per Cent | Num- ber | Per Cent |
| d. | Number represented by schools having telegraphic type of intercollegiate athletics for women. | | | | |
| 1. | Yes | | | 63,231 | 52+ |
| 2. | No | | | 57,494 | 47+ |
| e. | Number represented by schools having Play Days. | | | | |
| 1. | Yes | | | 97,081 | 80+ |
| 2. | No | | | 23,644 | 19+ |

XIII. Comparative study of colleges grouped by number of women enrolled.

| No. of women enrolled per college | No. of women students in this group | No. of colleges in this group | "Against" | | "For" | | In doubt on stand | |
|---|---|-------------------------------------|-------------|-------------|-------------|-------------|----------------------|-------------|
| | | | Num- ber | Per cent | Num- ber | Per cent | Num- ber | Per cent |
| Below 300 | 3,425 | 15 | 13 | 86+ | 2 | 13+ | | |
| 300 to 600 | 11,479 | 27 | 19 | 70+ | 7 | 25+ | 1 | 3+ |
| 600 to 1000 | 13,492 | 19 | 16 | 84+ | 2 | 10+ | 1 | 5+ |
| 1000 to 2000 | 26,409 | 20 | 15 | 75 | 4 | 20 | 1 | 5 |
| 2000 to 3000 | 16,479 | 7 | 5 | 70+ | 1 | 14+ | 1 | 14+ |
| Over 3000 | 49,441 | 10 | 10 | 100 | | | | |
| TOTALS | 120,725 | 98 | 78 | 79+ | 16 | 16+ | 4 | 4+ |

| | | —1923— | | —1930— | |
|------|--|-------------|-------------|-------------|-------------|
| | | Num- ber | Per Cent | Num- ber | Per Cent |
| XIV. | <i>Lack of interest in intercollegiate athletics for women even on the part of people outside of the Department of Physical Education for Women.</i> | | | | |
| a. | Number of colleges replying to this question .. | | | 91 | |
| 1. | Of these, number having no persons even outside the department interested in an intercollegiate program for women | | | 85 | 93 |
| 2. | Of these, number having persons outside the department interested | | | 6 | 6 |

(In these six colleges, one has a Dean of Women and President who would like to have intercollegiate athletics for women promoted, one has a faculty and an alumni group so interested, one has a Department of Education and Administrative offices interested, one has in its community certain A.A.U. champions and Municipal teams eager to create such an interest and one has on its faculty (but not in the Physical Education Department) a woman who is a former athletic champion, one who would eagerly back a movement for intercollegiate athletics for women. Aside from these few persons, the college world seems to find no one interested in the promotion of our intercollegiate athletic program for women.)

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| <i>XV. Improbability of arousing interest in such a program even should the directors desire to do so.</i> | | | | |
| a. Number of colleges replying to this question... | | | 60 | |
| 1. Of these, number of directors who could find no outside support for such a project | | | 44 | 73 |
| 2. Of these, number of directors who could find support should they seek it | | | 16 | 26 |
| (One could count on the support of the men of the faculty; one, on the local Y.M. C.A. and a local sporting goods store; one, on the local sororities; one, on a faculty man who is a professor of education; one, on the general student body; one, on the college publicity department; two on the men's physical education department; one, on the university editor; one, on the business men of the town; one, on the president and athletic council (all men); one, on the men students in general; one, on the men student athletes; one on the military department; one, on the regents of the university; one, on a woman professor of English. The preponderance of men over women in this situation is interesting to note.) | | | | |

XVI. Colleges having persons outside physical education department who are against intercollegiate athletics and would vigorously oppose the promotion of such a program.

| | | |
|---|----|----|
| a. Number of colleges replying to this question... | 72 | |
| 1. Of these, number that would encounter effective opposition to promotion of such a program | 49 | 68 |
| 2. Of these, number that probably would not encounter effective opposition | 23 | 31 |
| (Note that while there might be found 26% support outside of the department in favor of the promotion of an intercollegiate athletic program for women, there would be a 68% effective opposition to such a plan from forces outside the department.) | | |

B. Interclass Form of Intercollegiate Athletics for Women

I. Participation.

| | | | | |
|--|-------|-----|-------|-----|
| a. Number of colleges using this form of intercollegiate athletics | 5 | 10 | 3 | 3+ |
| b. Number not having this form | 45 | 90 | 91 | 92+ |
| c. Number not replying | 0 | | 4 | 4+ |
| | <hr/> | | <hr/> | |
| | 50 | 100 | 98 | 100 |

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| II. 'For' and 'Against.' | | | | |
| a. Number of directors 'for' this form | | | 32 | 32+ |
| 1. Of these, also 'for' varsity form | | | 10 | 31+ |
| 2. Of these, 'in doubt' about varsity form | | | 3 | 9+ |
| 3. Of these, 'against' varsity form | | | 19 | 59+ |
| b. Number of directors 'against' this form of intercollegiate athletics' | | | 32 | 32+ |
| c. Number of directors 'in doubt' | | | 4 | 4+ |
| d. Number of directors not replying to question .. | | | 30 | 30+ |
| | — | — | 98 | 100 |

III. Varsity vs. interclass intercollegiate athletics.

| | | |
|---|----|-----|
| a. Number of directors 'for' varsity type | 16 | 17+ |
| 1. Of these, 'for' interclass type | 10 | 62+ |
| 2. Of these, 'against' interclass type | 2 | 12+ |
| 3. Of these, number not answering | 4 | 24+ |

C. Telegraphic Intercollegiate Athletics for Women

I. Participation.

| | | |
|--|----|-----|
| a. Number of colleges having this form of athletics | 39 | 39+ |
| 1. Of these, number 'against' it | 7 | 17+ |
| 2. Of these, number 'for' it | 32 | 82+ |
| b. Number of colleges not having this form of intercollegiate athletics | 53 | 54+ |
| c. Number of colleges not answering | 6 | 6+ |
| | — | — |
| | 98 | 100 |

II. For and Against.

| | | |
|--|----|-----|
| a. Number of directors 'for' this form of inter- collegiate athletics | 59 | 60+ |
| b. Number of directors 'against' | 7 | 7+ |
| c. Number of directors 'in doubt' or 'unclassified'... | 4 | 4+ |
| d. Number of directors not answering | 28 | 28+ |
| | — | — |
| | 98 | 100 |

III. Sections of United States covered by colleges —1923—

having this form of competition.

Middle West

All sections

IV. Activities used.

| | | |
|--|------------------------|---|
| a. Types of activities used in this form of intercollegiate athletics | Riflemarks- manship | Riflemarks- manship, Archery, Swimming, Track & Field |
| b. Greatest number of these so used in any one college | 1 | 2 |

¹ One of these 32 took part in interclass intercollegiate athletics as a student and she states that from her experience she found the general effect to be about the same as in varsity type and, from her experience, she is opposed to both.

| | —1923— Num- ber | Per Cent | —1930— Num- ber | Per Cent |
|---|-----------------------|-------------|-----------------------|-------------|
| <i>V. Record of 39 participating colleges.</i> | | | | |
| a. Number of colleges so using two activities.. | | | 4 | |
| b. Number of colleges so using only one activity | | | 24 | |
| 1. Of these, number using archery only | | | 8 | |
| 2. Of these, number using track and field only | | | 0 | |
| 3. Of these, number using riflemarksmanship only | | | 11 | |
| 4. Of these, number using swimming only | | | 5 | |
| c. Number not reporting on their activities | | | 11 | |
| | | | <hr/> 39 | |

D. Play Days or Sports Days*I. Play Days in 1930.*

| | |
|--|-----|
| a. Number of colleges having Play Days in 1930 | 53 |
| b. Number of college Play Days held in these 53 colleges | 74 |
| c. Grand total number of colleges in these 74 Play Days ^a | 291 |
| d. Average number of colleges in each Play Day.. | 4 |
| e. Number of colleges participating in only 1 Play Day in 1930 | 42 |
| f. Number of colleges participating in only 2 Play Days in 1930 | 7 |
| g. Number of colleges participating in only 3 Play Days in 1930 | 3 |
| h. Number of colleges participating in 9 Play Days | 1 |

II. Activities used.

| | |
|---|----|
| a. Greatest number used in any one Play Day .. | 7 |
| b. Least number used in any one Play Day | 1 |
| c. Names of activities and number of Play Days in which each was used | 24 |
| Basketball | 34 |
| Baseball | 31 |
| Tennis | 23 |
| Hockey | 22 |
| Volleyball | 19 |
| Swimming | 15 |
| Archery | 9 |
| Soccer | 7 |
| Group games | 4 |
| Dancing | 4 |
| Track & Field | 3 |
| Riding | 3 |
| Horseshoe pitching | 2 |
| Golf | 2 |
| Ice hockey | 2 |
| Deck tennis | 2 |
| Darts | 1 |
| Clogging | 1 |
| Lacrosse | 1 |
| Fieldball | 1 |
| Stunts | 1 |
| Fencing | 1 |
| Ping Pong | 1 |

^a This does not mean that 291 different colleges took part in these 74 Play Days; in many cases a number of colleges are duplicated in this count.

The Situation in Colleges Having Intercollegiate Athletics for Women

A. Present Record of Colleges, Reporting Participation in Intercollegiate Athletics for Women in 1923

Barnard College—Discontinued soon after 1923. *Bryn Mawr College*—Still conducts such activities. (Information received from indirect report. They did not answer the questionnaire.) *Mills College*—Discontinued—used interclass type only. *Oregon Agricultural College*—Discontinued—used interclass type only. *Radcliffe College*—Still conducts such activities. *Stanford University*—Discontinued—used interclass type only. *Swarthmore College*—Still conducts such activities. (Information received from indirect report. They did not answer the questionnaire.) *Sweetbriar College*—Still conducts such activities. *University of Arizona*—Still conducts such activities. *University of California*—Discontinued—used interclass type only. *University of Oregon*—Discontinued—used interclass type only.

Six of these eleven have discontinued intercollegiate athletics since 1923, five of these having used only the interclass intercollegiate type. Of the remaining five, all of them used and still do use the varsity type of intercollegiate athletics. Four of these five are eastern colleges and one is a western college. Of these five, only three are included in the eleven of the 1930 study who report that they have intercollegiate athletics.

B. Record of Colleges Participating in Intercollegiate Athletics for Women in 1930

Brown University—Uses four sports, plays three to four matches in each and meets two colleges and a professional school. *Drexel Institute*—Uses three sports, plays two to eight matches in each and meets four colleges and two clubs. *George Washington University*—Uses four sports, plays two to four matches in each and meets six different colleges. There is great probability of intercollegiate athletics being discontinued there this year. *Ohio Wesleyan University*—Uses interclass intercollegiate athletics only, uses three sports and meets one college. *Radcliffe College*—Uses four sports, plays three matches in each and meets three colleges. *Sweetbriar College*—Uses two sports, plays two to three matches in each and meets three colleges and two clubs. Uses both varsity and interclass-intercollegiate competition. *Tennessee State Teachers College*—Uses two sports, plays two to six matches in each and meets four colleges. *Vassar College*—Uses tennis only, plays one match with one college. *Westhampton College*—Uses two sports, plays three to four matches in each, meets three colleges with its "varsity" team and meets eight schools and clubs with its "second" team. Uses both varsity and interclass-intercollegiate competition. *Wheaton College*—Uses four sports, plays three matches in each and meets two colleges and one club. *University of Arizona*—Did not have an intercollegiate athletic program in 1929-30 on account of the absence of the director but it usually does have a program and therefore was counted as having one. It uses two sports and meets two colleges. *University of Maine*—uses two sports, plays three or four matches in each and meets two colleges and one professional school. It is discontinuing intercollegiate athletics this year.

C. Colleges Participating in Intercollegiate Athletics for Women not Included in this Study.

Either through failure to reply to the questions or through failure to receive one, certain directors did not send in reports so that this study does not include

some of the colleges named by the eleven as colleges meeting them in intercollegiate athletics. These colleges are:

| | |
|--------------------------------------|-----------------------------|
| Beaver College | New York University |
| Bryn Mawr College | Randolph-Macon College |
| Carson & Newman College | Swarthmore College |
| Cedar Crest College | Tusculum College |
| Connecticut Agricultural College | University of New Mexico |
| Denison University (interclass only) | University of Pennsylvania |
| Emory and Henry College | Ursinus College |
| Lincoln Memorial College | Western Maryland University |
| William & Mary College | |

(In 1923 there was the same inability to procure direct information from many colleges reported as having intercollegiate athletic competition. Unfortunately they were not listed so that we now have no 1923 list to compare with the above 1930 list of indirect reports.)

D. States Represented by Colleges Participating in Intercollegiate Athletics for Women

| | 1923 | 1930 |
|---|--|---|
| <i>Varsity Type.</i> In both studies only the east, south and southwest sections of the country fall in this class. | Arizona New York Pennsylvania Massachusetts Virginia | Arizona New York Pennsylvania Massachusetts Virginia Maine Rhode Island Tennessee Washington, D.C. |
| <i>Interclass Intercollegiate Athletics.</i> | California Oregon | Ohio Virginia |
| <i>Telegraphic Intercollegiate Athletics.</i> | few Middle West States | 28 different states from all sections of the country |

E. Activities Used in Intercollegiate Athletics for Women

| | —1923— | | —1930— | |
|---|-------------|-------------|-------------|-------------|
| | Num- ber | Per Cent | Num- ber | Per Cent |
| Number of colleges reporting on intercollegiate athletics | 11 | | 12 | |
| Basketball | 11 | | 8 | |
| Tennis | 9 | | 9 | |
| Hockey | 7 | | 8 | |
| Swimming | 5 | | 4 | |
| Baseball | 4 | | 3 | |
| Archery | 2 | | 1 | |
| Rowing | 2 | | 0 | |
| Handball | 2 | | 0 | |
| Fencing | 1 | | 0 | |
| Greatest number of activities used by any one college for intercollegiate athletics | 7 | | 4 | |
| Least number of activities used by any one college for intercollegiate athletics | 2 | | 1 | |
| Average number of activities used in the colleges for intercollegiate athletics | 4 | | 2.72 | |

Summary

Intercollegiate athletic competition for women does not exist in the colleges of the United States except in a very limited number and percentage. Although the number of twelve of the 1930 study as compared to the number of 11 of the 1923 study, seems to show a slight increase, the percents of the two studies show a decided decrease since the new study covers a much wider area of the collegiate world and we have a 12% participation showing in 1930 as against a 22% participation showing in 1923.

The varsity type of competition was found in 1923 only in one western, one southern, and three eastern states, while in 1930 it is found in the same states, and in addition in one more southern and 3 more eastern states.

The interclass intercollegiate type although scarcely existing in 1923 with five colleges supporting it is still less alive in 1930 with only three colleges supporting it.

The telegraphic intercollegiate type has grown considerably since 1923 but it is not even now in especial favor or disfavor. It existed only in certain middle west colleges in 1923 but now is used in all parts of the country.

There may be a growing percentage of directors who approve of intercollegiate athletics but there is a decreasing percentage of directors who are *ardently* in favor of such competition.

It is interesting to note that while only 18% of those who approve are ardent in their approval, 65% of those who disapprove are ardent

in their disapproval. Still further it is a curious fact that 25% of those who are quite ardent in their disapproval in 1930 were within the past eight years on the side of approval.

There is in 1930 a smaller percent who feel that participation in intercollegiate athletics is physically harmful yet 41% of those who feel that it is not harmful, do however, disapprove on other grounds.

Just as a smaller percent feel that such competition is harmful, there is a greatly increased percent who feel that it, at least, is not of physical benefit to participants.

It is interesting to note that five directors approve of intercollegiate athletic competition yet claim that the majority is neglected for the few, while seven who do have an intercollegiate program maintain that the majority is not neglected for the few.

Of the directors who have had experience with intercollegiate athletics for women either as students or teachers only 25% approve of such competition in 1930 but this is a much higher percentage than the 6+ % of 1923.

There is little tendency on the part of physical directors to change their opinions on this subject; less tendency in 1930 than in 1923. Of those who have changed of recent years, the majority have changed from an attitude of approval to one of disapproval. However, there does exist in 1930 a very small group of women who have recently changed from disapproval to approval whereas in 1923 there was no such group. In 1923, 74% held the same views they held the two or three years previous to that date. (The questionnaire then did not go back as far as eight years.) 94% of these were "against." 26+ % had changed their views and all or 100% of this group changed from approval to disapproval. To compare the two studies on the basis of a two or three year period of time, we find that in 1930, 92+ % held the same views with 89% of these "against." Only 7+ % had changed their views within this short period and of these 91% had changed from approval to disapproval.

With 79% of directors "against," 85% of the physical education department staff members are against, and with 16% of directors "for," 14% of the staff members are "for."

While 100% of the directors in our largest colleges are "against," 5% of their staff members are "for."

A larger percentage of W.A.A.'s agree with their directors on the subject in 1930 than agreed in 1923. Then 81% of those that did agree were "against," now 86% of those are "against."

If the directors themselves who are "against" have dropped from 86% to 79%, the W.A.A.'s that are "against" have increased from 52% to 72% in these seven years.

We find the majority of women students agreeing on the question with their W.A.A.'s in far larger numbers in 1930 and also find the same trend in regard to these two elements and the departments of physical education combined.

While 11% of the colleges of this study are engaged in varsity type of intercollegiate competition this 11% represents only 7% of the women enrolled in these 98 colleges, so that it is indeed only a very small group of our young women that is touched by this problem in any way. Since the average number of sports engaged in for intercollegiate competition is from two to three and 15 players would probably represent a varsity squad for each, it perhaps is not far wrong to surmise that only 495 women are involved in this competition in the 11 colleges. This is 5.7% of the number of women enrolled in these 11 colleges and only 0.41% of number of women students involved in this study. Therefore we can say that only 0.41% of women college students engage in varsity intercollegiate competition and as this number is so engaged 6.1% of women students (college mates of this 0.41%) may or may not be neglected, depending upon the particular athletic organization within each college.

While varsity intercollegiate competition in 1923 called for an average of four sports so used per college, in 1930 the average has dropped to 2.72.

There is little interest among people outside the physical education profession for promotion of intercollegiate competition for women. What little interest there is comes from men rather than women.

The Play Day idea seems to have taken our colleges by storm but the suggestion coming from a few sources that this competition be organized as college vs. college is met with approval by only a minority.

Conclusion

It is interesting to note the rising tide of condemnation of men's intercollegiate athletics. It has grown from a mild protest, voiced by a few in the study of 1923, to most emphatic statements of disapproval, voiced by a large number in this present study of 1930. There exists a great fear that once intercollegiate athletics for women gain a foothold, college women might become involved in the same athletic predicament of their brothers. The director who replies in the following strain seems to voice the opinion of the great majority when she says "I would approve of a program of intercollegiate athletics for women if it would actually be conducted as amateur sports should be conducted but not as men's intercollegiate athletics are conducted in this country." There is ever present the alarming thought that

women might become involved in something equally undesirable. Directors for women seem to feel that these fears are not altogether idle fancies, judging from the pressure being brought to bear in yearly growing force from certain sources.

While one director writes "We 'stew' too much about organized recreation and sports. It is impossible to generalize for there are so many factors involved," yet another writes "the whole thought life of women is changing rapidly and its expression in activity is bound to change. The subject of athletics becomes one of the thought provoking questions."

The following quotations voice the opinions of many who replied in the same strain as did the writers of these lines.

"Intercollegiate athletics and strong general participation of students in athletics are incompatible."

"I have coached two teams each participating in one intercollegiate game per year. I feel they gained nothing from the games and as for 'college spirit' it was no better after the games."

"No group of players is so skillful that it is necessary for it to go outside its own college walls to find worthy opponents to play against. The skillful players can be cared for at home in an intramural program and can get all the strenuous playing they need and should have and the athletic needs of the other students can be cared for at the same time."

"Why an intercollegiate program when all its advantages can be worked into an intramural program and all its disadvantages eliminated?"

"By the time every college has 90 or 95% of its women students participating in a sports program, then and not until then, have we a right to begin thinking in terms of intercollegiate athletics."

"The competitive element is already greatly over-emphasized in all phases of our society. With the comparatively recent background which we have for women's athletics a country wide acceptance of the 'varsity' idea must necessarily be based on the poor standards of men. I do not believe we are in the stage of development which warrants a belief that this type of activity can be promoted to the extent that it will be beneficial."

"The only excuse I see for promoting a program of intercollegiate athletics for women would be in the case of a need to give certain women superior and intensive training so that they might be prepared to enter the world of professional sports for their life work after their college days. There is positively no other life situation that I can picture that calls for such athletic training. Thank goodness our colleges are not yet offering training for professional sports as a branch of their activities—at least not such training for women.

May the day never come when our colleges lose all sense of proportion and throw to the four winds all educational ideals in regard to women's athletics as they have done in regard to men's athletics. Let us fight if necessary to keep our young women free to play healthfully and wholesomely. As a student I was captain of our varsity hockey team that played matches with two different colleges as "curtain raisers" to football games. As a young teacher I refereed many a shameful interscholastic basketball match. Any one, who has had such experiences and is interested in educational ideals and in creating in this world a spirit of friendliness towards others, knows that there is positively nothing of value to gain in an intercollegiate program but that there is much of value to lose."

From a careful perusal of the questionnaires filled out, there seems to be a dearth of quotations to offer from the side that champions intercollegiate athletics for women. Those who are "for" seem quite content to cast their vote "for" with few remarks while a great many of those who are "against" seem eager to seize the opportunity "to speak out in meeting" for their side. Hence the few quotations to offer on the one side. But following are those that are offered:

"All of our intercollegiate contests are made social events and not sporting events as is the case with men's intercollegiate athletics."

"I approve of intercollegiate athletics in my case since conditions are ideal but I would not approve in most cases as conditions exist today." This director is in a woman's college where campus life is devoid of the "hurley-burley-rah-rah-circus-side-show" atmosphere of men's athletics and where the young women are not constantly distracted by "dates."

"I approve of intercollegiate athletics in the individual sports but not in sports of body contact."

In regard to Play Days, one director says "In a few years we must have some kind of competition other than that of present Play Days but I am not sure what it should be," while another says "Playing college vs. college is a more natural form of competition than that with mixed groups." But on the other hand, still a third director says "After college days, all opportunity to participate in any form of athletics comes to us through spontaneous mixed groupings. We play golf with this person from that school today and with some one from another school tomorrow and with someone, who never went to college, the day after that; we play hockey on a team with girls from many different colleges and against girls from as many more different colleges. We play tennis and all sports in the same unorganized manner and yet we have a fine time and get wholesome recreation out of it. If participating in sports in after college life means learning to find enjoyment and benefit from playing with

mixed and spontaneous groups, why not give the student training in such natural procedure while she is yet in college? The Play Day idea is absolutely in accord with the sort of play and competition practically all women will engage in, in after college days, if they do engage in any sports at all. Why then all this talk about having sports as college vs. college in our Play Days? Why aren't we eager to seize this opportunity to train our students to meet life's real situation? Here is our chance to train for an actual carry over into after college days."

In the position of one who is presenting both sides of the question, the writer finds it necessary merely to present and to let the statements of those who are "for" and the statements of those who are "against" speak for themselves, and to let the figures in the statistics tell their own story of the situation as it stands today. Many of the suggestions, especially some concerning Play Days, will most probably sound utterly naive to most men and to some women but they prove how absolutely determined are the women of the physical education profession and, judging from the report of A.C.A.C.W. for 1930, how determined also are the women college students of today, not to permit women's athletics to follow in the footsteps of men's athletics. They are determined to keep them free of all taint of professionalism and commercialization—to keep them quite informal, entirely sane, and absolutely wholesome.

(Reprints of this article may be obtained through Women's Division, N.A.A.F., 303 West 42nd Street, New York City. Price 30c.

Suggested Subjects for Physical Education Theses and Dissertations

Arranged by A. D. BROWNE, M. D.

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Part I

The psychology of play.
Mental and physical development.
Recreation for all in the high school through better organization and supervision.
Physical education in the high schools of
The advisability of Military training.
Military training in the high schools.
A course in hygiene for a city normal school.
Some aspects of physical education in relation to the war.
A study of the scholarship of athletes.
The organization and administration of physical education.
Blood pressure tests of exercise: basketball, track, field, Barringer test.
The municipalization of play and recreation.
Correlation of school and playground.
A study of the health supervision of schools of
A course of study in health for elementary schools.
The development of health inspection in schools.
A sanitary survey of the school plants of rural
A minimum set of tentative physical standards for children of school age.
A study of the chest index of high school girls.
The educational significance of physical training.
Relation of play to delinquency and vice.
The legal provision for health education.
The history of physical education in public schools and colleges.
Bright children: mental, educational and physical correlation.
A method of finding the physical quotient and its relation to the intelligence quotient.
The extra school activities of the high school boy.
Training for the proper use of leisure time.
The making of an outdoor play.
A study of the health work of the schools of
Health of the school and community.
The status of physical education for girls in the high school.
The status of physical education and health in the high schools of
Physical education in the city schools.
A comparison of the grades and intelligence quotients of athletes and non-athletes in high school.
A correlation of musical ability and dancing ability.
The teaching of hygiene and sanitation.
Recreation of rural people.

- A survey of health conditions in grade schools with some educational implications.
- Organized work for boys in
- Principal defects of school children and methods of correction.
- History and present status of military training in land-grant colleges.
- Corrective gymnastics in an elementary school.
- Health, physical development and scholarship.
- The administration of a physical education program.
- History of the development of physical education for women in
- Physical education in the schools of
- Health education in the high schools of the United States, past and present.
- Development of public health service in
- Present status of Health instruction in the sixth, seventh, and eighth grades of thirty selected cities.
- The activity school: new tendencies in educational method in critically examined.
- Safety education in the elementary school: a technique for developing subject matter.
- Extra curricular activities.
- An experimental study of the development and measurement of health practices of elementary school children.
- ✓ Possible contributions of curricular and extra-curricular activities of the senior high school to character development.
- Extra-curricular and curriculum activities.
- Teaching the worthy use of leisure.
- A constructive plan for extra-curricular activities in Junior high schools.
- Extra class activities.
- A study of school postures and desk dimensions.
- ✓ Scholastic abilities of athletic and non-athletic groups.
- Relation of physical education to intelligence and scholarship ratings of high school girls.
- Practice gains in track and field.
- A further study in training and conditioning of adolescent girls and adult women.
- The relation between manual dexterity and mentality of the blind.
- The significance of anatomical development in relation to certain educational problems.
- The effect of coaching upon the acquisition of skill in the basketball free-throw.
- A study to determine the correlation between physical and mental proficiencies, and the correlation between physical proficiency and leadership, and mental proficiency and leadership.
- Primitive motivations of the dance.
- A classification of rhythmical activities.
- The relationship between mental achievement and accomplishment rankings of athletes and non-athletes in secondary schools.
- ✓ Physical and mental growth in relation to moral and religious education.
- ✓ The learning curve of basketball technique among high school boys.
- Relative importance of age, height, and weight, as contributing forces to physical achievement.
- Trait ratings of two groups of boys differentiated with respect to diversity of play interest.
- The influence of ten minutes of strenuous physical exercise upon heart rates.
- A study of the physical and mental development of children under two years of age.
- A study of the physical growth of children in
- A study of the attitudes and ideals of adolescent boys.

Correlation between different motor abilities.

A study of the factors conditioning the acquisition of skill in swimming.

An experimental investigation of the learning involved in ball tossing.

The influence of chronological age versus mental age on the play activities of boys.

A comparative study of gymnastics and intelligence.

The influence of age, height, and weight per inch upon motor ability.

A comparative study of gymnastics and intelligence.

Measuring motor ability. A scale of motor ability tests.

Essential qualities in certain aspects of physical education with measuring and developing the same.

A study of mental and physical measurements of the

Tests and measurements in physical education.

The determination of physical efficiency in one test.

Rhythm in a pre-school education.

Health problem sources.

High school biology as a contributing factor in health education.

Physical education in public rural schools.

A survey of the activities of adults in a rural community.

A study of school health work in

The administration and cost of high school interscholastic athletics.

The cost of athletics in two high schools.

The organization, administration and financing of extra-curricular activities.

Administration of extra-curricular activities in secondary schools.

The extra-curricular activities in the schools.

The organized direction of boys' time within and without the modern high school.

The present status of intramural sports in the with special reference to boys' activities.

A high school curriculum for boys, in physical education.

An investigation to determine the desirability of extra-curricular activities in the high schools of

Extra curricular activities and grades.

Physical education in the small high school.

A comparative study in terms of teachers' marks of the scholastic records made by male participants and non-participants in high school athletics.

Pageants and festivals for secondary schools.

A comparison of the grades made by athletes and non-athletes in high schools.

The training of the high school physical director in the state of

The teacher of physical training for boys in secondary schools.

A study in the selection of prospective teachers of physical education.

The organization of professional training in physical education in the state universities.

Organization of the required physical education for women in state universities.

The status of military training in American universities.

Extra curricular activities in normal schools.

The extra curricular activities of the junior college.

The grades and athletic abilities of university freshmen in the coaching course.

An analysis of education objectives and outcomes in the field of health education.

Subject matter in health education.

A social critique of current tendencies.

Needs and practices in health education.

A workable plan for establishing health habits.

A study of the health demonstration in

A survey of the health work and physical education in institutions.

Nutrition as a form of health education in

Health education as a part of a comprehensive educational program.

Health knowledge and health habits.

Progression in physical education activities.

Students' use of leisure time activities learned in physical education in State Teachers colleges.

Interscholastic non-athletic contests.

The status of high school athletics in

Actual space facilities for physical education as prescribed by the Ohio school code, with special reference to

Competitive athletics for womankind in the United States.

Policies of school boards in the hiring of football coaches.

The status of physical education in

The place of physical education in the educational program.

An evaluation of the content, methods and results of health education in the elementary schools of

Uniform interscholastic high school athletic regulations.

Physical education for boys and its value for citizenship.

The comparative value of the American system of physical education and others; notably the German and Swedish.

The administration of a physical education program for girls in the high schools not having gymnasiums and evaluation of plans in common use.

The extent and character of individual and group participation in sponsored and unsponsored athletic activities in seven Illinois high schools.

The justification of physical education as a part of the high school program.

Physical education for blind girls.

A correspondence course for coaching basketball for girls.

Program of physical education activities.

A program of physical education for senior high school girls correlating health activities.

Analysis of the administration and supervision of health education and physical education in the various states.

A study of the objectives in health education in the high schools.

Physical education in the high schools of the United States.

The problem of the professional training in physical training.

Phases of the corrective physical education movement with special reference to the work being done in the public schools.

Values of dancing in physical education.

A program of physical education activities for elementary and high schools.

Baseball as an educational means.

Health work in high schools.

A method for determining the objectives specific to a physical education course in high schools.

The scientific knowledge affording a basis for intelligent control of bodily exercises.

The administration of physical education in the large high schools of.....

A program for correlation between boy scout activities and the junior high schools.

Play for the needs of the child.

The development and influence of the playground movement as related to American youth.

A survey of recreation in relation to living conditions in

The development of play and its application to religious education.

A study of the recreational activities of employed women.

A study of after school activities.

The summer camp's contribution to health education.

- A study of the dramatic play of children from two to five years of age.
- The playground in its relation to leisure time of the junior high school pupil.
- Safety education and its relation to boys' clubs.
- A health survey of the continuation schools.
- A correspondence course in festivals and pageants for educational institutions.
- Correspondence course in the principles of leadership in summer camps.
- Is there a place for a representative basketball team in a boys club?
- A study of the attitudes and ideals of adolescent boys.
- Trends in Athletic Competition, with Brief Survey of Recent Attitudes. The aim of this survey is to show what has been the attitude, what is the present situation, and what should be the attitude of leaders toward athletic competition for girls.
- Study of Growth, Age, Height and Weight in Relation to Physical Ability. Dr. Burdick presented informally a number of acts related to this section. He promised to report to the committee on the results of his study of the medical examinations of 5,000 girls, these examinations taken three years apart.
- What are the differences in the nature of leadership for different aged girls for different activities?
- What are the special problems of arts and crafts leadership?
- An arts and craft program for summer camps.
- What are the special problems of recreation leadership for girls and women?
- What are the problems of athletic leadership and how are they being met?
- Problems of recreational leadership in rural districts.
- Analysis of the student body at George Peabody College for Teachers.
- Comparison of content and method of Physical Education programs administered and promoted by different school graduates, such as Wellesley, Teachers College at Columbia University, Peabody College, Sargent School.
- Physical phases of community affairs.
- A study of teaching procedure in physical education.
- Difficulties in the administration of physical education.
- A study of method to improve participation in extra-curricular activities.
- Physical education for the pre-school age child.
- Old English players—dramatic.
- Organization of activities for girls of the adolescent age.
- Physical education catechism.
- Some disquieting aspects of our athletic programs.
- Sex and the dance.
- Decoration and the dance.
- Music and the dance.
- Movements and the dance.
- An analysis of the literature on the methods for teaching physical education.
- Physical education technique for training.
- The value of certain physical education courses as a means of general education.
- Physical education agencies for character training.
- A comparison of content and method in physical education in state universities, state teachers colleges and special physical education schools.
- Contributions of Greek literature to physical education.
- Activities and trait analysis.
- A study of the tournament system of state high school debating leagues, English teams and athletic contests, etc.
- Educational value in extra-curricular activities.
- A psychological basis for objectives in physical education.
- A physiological basis for objectives in physical education.
- Methods and measurements of health education.

Methods for planning a teachable learning unit in health and physical education.

A study of arrested growth of the pelvic bones in girls.

A survey of recreation in relation to living conditions in industrial communities of the South.

◀ A study of the various agencies in America promoting physical education.

The following subjects need further investigation:

Studies of laws of growth—Studies of laws of growth in relation to exercise, dosage and types; Studies of laws of diet for growth in relation to exercise and maintenance.

Chemistry of blood, both arterial and venous with different types of exercise (speed, strength, endurance)

- (1) Study of sugar content of blood before, during and after different types of exercise.
- (2) Study of lactic acid content of blood, arterial and venous.
- (3) Study of resynthesis of lactic acid in muscles.
- (4) Study of other constituents of blood under exercise and fatigue conditions.
- (5) Study of chemical problems of training.

Chemistry of urine in relation to exercise. This study would include the albumin content of the urine under all of the conditions mentioned under the study of sugar, as well as the other chemical constituents of the urine.

Postural problems in relation to health and efficiency (Kyphosis, Lordosis, Scoliosis, Flat and pronated feet).

✓ Mechanical problems in the acquiring of motor skills. This would include a study of the mechanics in athletics, swimming and gymnastics.

- (1) Length and elasticity of opposing muscles in relation to round shoulders and flat feet.

Physiology of growth.

- (1) in pre-pubescent and post-pubescent. (This should include studies for some twelve years using the same children with the following topics: Age, height, weight, chest girths, respiratory capacity, heart rate, blood pressure, muscle strength, muscle skills, scholarship, only may be taken during the first six years with the inclusion of all items for the 7th to the 12th year.

Physiology of exercise.

- (1) Physiology of swimming.
- (2) Physiology of sport—fall Rugby and soccer; winter basketball; spring track and baseball.
- (3) Physiology of gymnastics.
- (4) Muscle skills
 - a. Useful skills in relation to industry and recreation.
 - b. Native skill abilities of various groups of individuals.
 - c. Rates of progress in learning skills.
 - d. Relation of neuro-muscular skills to nervous stability.
- (5) Fatigue problems related to physical condition and staleness. —

Social psychology.

- (1) Social control of individuals through individual leadership.
- (2) Social control of definite groups, e.g., teams.
- (3) Social control of crowds.

Effects of various factors.

- (1) Environment
- (2) Newspapers
- (3) Pictures

Study objectively of different social acts.

Study of factors essential to leadership.

- (1) In how far are qualities of leadership native.

- (2) In how far are these qualities acquired.
- (3) Study of the leadership in college and later life.
 - a. Study the upper and lower third of the students in high school and college compared with the middle and lower thirds, comparing scholarship, committee leadership, team leadership and other qualities with their later work. Compare those leaving before completing their course who are in the lower third in scholarship grades, and also those in the upper grades who left. How have they succeeded compared with the graduates?

Psychology of learning.

- (1) The methods in the learning process and rates of progress.
 - a. In athletics
 - b. In gymnastics
 - c. In aquatics

Personnel and mental test studies.

- (1) Intelligence in relation to leadership, correlating present and future leadership of graduates with their intelligence as shown by high school and college marks or intelligence tests which are available in the later years.
- (2) Correlation of Haggerty's non-intelligence qualities—sympathy, persistence, tact, etc., with leadership.

Character training.—Physiological basis, Psychological basis, Social basis.

Costs of constructions—Gymnasium construction; pool construction; shower room construction; locker room construction; minimum hall and circulation space needed.

Unit plan needs per individual for different types of activities.

Unit cost of maintenance—Repairs in different types of buildings; Cost of janitorial service per unit of space and per unit of use.

Part II

The following is a list of theses that have been written in partial fulfillment of requirements for the Master's Degree in Physical Education at George Peabody College for Teachers, Nashville, Tenn.

The Effect of Costume on Posture.

A Program of Physical Education for Two-Year Normal Schools.

A Program of Physical Activities for High School Boys.

Hygienic Living and Health Teaching in Elementary Schools.

A Correspondence Course in the Theory and Principles of Physical Education.

A Manual of Physical Education Applicable to Conditions in Oklahoma (Elementary Schools)

Physical Education Through an Established Program of Incentives.

Authentic Folk Costumes for Folk Dances (National, Country and Character).

Pageants and Festivals for Secondary Schools.

Play for the Needs of the Child.

Recreation in Industry.

Self-Testing Activities.

The Kinesiology of Track and Field Events.

Girls' Physical Education Program for Texas Junior High Schools.

A Classification of Rhythmical Activities.

A Program of Physical Training Activities for Elementary and High Schools.

Correspondence Course in Festivals and Pageants for Educational Institutions.

Correspondence Course of the Principles of Leadership in Summer Camps.

Correspondence Course in Coaching of Girls' Basketball.

A Study of the Motor Ability of Junior High School Students.

Sportsmanship in Literature.

Plays and Games of Other Nations and Races.

An investigation of Terminology in the Field of Physical Education.

Physical Exercises as Practiced Among the Early Greeks and Romans.

Activities for Children in Orthopedic Hospitals.
The Relation of Physical Training and Literary Training.
A Physical Training Manual for Tennessee Schools.
A Manual for Safety Education in Elementary Schools.
A Study of the History of Dancing.
The Application of the Symbolism of Color to the Dance.
A Physical Education Program for Health Conditions Found in Peabody Students.
The Development and Presentation of a May Day Pageant.
Modification of the Higher Organized Games.
A Physical Education Program for Rural Schools.
Public Education in Physical Education.
Analysis of Highly Organized Athletic Games.
Health Procedures in a Boys' Junior High School Athletic Program.
The Relation of Play to Juvenile Delinquency.
How the Evils of Inter-Institutional Athletics May Be Corrected.
Analysis of Positions of Body in Game of Foot Ball.
A Manual for the Construction and Equipment of School Playgrounds.
Hobbies of a Few Professional Men and Women.
Annotated Bibliography of Magazine articles on Big Muscle Play Activities.
A Comparative Study of Representative Athletic Conferences (Intercollegiate).
A Study of the North American Indian Dance and Rites.
Elementary School Play Activities for Schools with Limited Supplies.
Source Material in Community Recreation.
Source Material for Training Teachers in Safety Education.
The Social, Religious and Economic Influences on the Origin of the Dance.
Kinesiology of Football.

Part III

The following subjects have been selected by candidates for the Master's Degree in Physical Education and are now in the process of preparation.

Analysis of Physical Educational Programs of Teacher Training Institutions.
History and Development of Waterplay.
Adaptation or Modification of Games of Low-Organization to the Physical Needs of Schoolground and School Building.
A Survey of Physical Education in the Germany of Today.
Valuating Inter-School Athletics in a Physical Education Program.
Survey of Physical Education in Missouri Before and After Compulsory Law.
The Coaching of Basketball.
The History and Development of English Folk Dancing.
The History and Development of Archery.
Kinesiology of the Natural Dance for Corrective Purposes.
Sequence of Movements in Fundamental Play Skills.
Physical Training as a Profession.
History of Physical Education in Texas.
History of Development of Tennis.
The Influence of Greek Dances on Modern Dance.
Dance Composition and Rhythmical Analysis.
A Study of Costume for Girls and Women in Physical Education.
Comparative Expenditures on Boys' Interscholastic Athletic Activities in a Selected List of High Schools.
The Rise and Development of the Spectator's Interest in Athletics.
Resume of Articles on Activities in Organized Summer Camps.
Athletic Injuries.
Popularizing Physical Education in a Community.

Justifying the Support of an Intramural Athletic Program in Schools and Colleges.

A Discussion of the Problems in Basketball for Girls.

Combinations and Multiplicity of Combination as Found in the Dance.

Tricks and Illusions for Social Entertainment.

The Dance in Art.

The Relation of the Cardinal Principles of Education to Physical Education.

Contributions of Physical Education to Secondary Education.

Comparison of Types of Students According to Roger's Strength Tests.

A Study of Football.

The Significance of Costumes in the Dance.

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BOOK REVIEWS

A WORLD PANORAMA OF HEALTH EDUCATION. (Health Section—World Federation of Education Associations, Geneva, Switzerland—July, 1929.) Am. Child Health Assoc. and the Metropolitan Life Insurance Co. 256 pp. 50c.

Dr. C. E. Turner, Professor of Biology and Public Health, Massachusetts Institute of Technology, Cambridge, Mass., was the chairman of the Health Section of the Geneva Education Convention.

In discussing the present and future program of the Health Section, he stated that the purpose of this section was to promote the quality of health work in the schools of the world—1. by making available to the leaders in each country a knowledge of the activities in progress in other countries—2. by the discussion of methods and—3. by the formulation of sound programs and recommendations which through the endorsements of the world federation will aid in securing national consents in improving health programs.

The chairman of the health section very specifically states that the conference would direct its attention toward health education which he defined as the health training and instruction of children. The report particularly discusses the classroom procedures and their relation to special health services, rather than the special technique of medical, nursing, dietetic or physical education services, although it does not touch upon physical education objectives, daily time allowances for physical education and school posture.

Representatives from the following countries attended the convention:

| | |
|----------------|---------------|
| Austria | France |
| Czechoslovakia | Germany |
| Estonia | Union of |
| Greece | Soviet |
| Hungary | Socialist |
| India | Republics |
| Japan | Bolivia |
| Latvia | Switzerland |
| Scotland | United States |
| Canada | |

A rather clear-cut picture of what the report includes may be gained from the following questions which are raised by the chairman of the meeting and which are answered by representatives present:

Health Education.

1. During which years of school life, from the first to the tenth, are regular classes of hygiene commonly held?
2. During which of these years does the pupil receive systematic health habit training at school?
3. During which years of school life are pupils weighed monthly and encouraged to watch their rate of gain as a means of interesting them in the development of health practices?
4. During which years of school life is a brief period set aside each day at the opening for cleanliness inspection and the checking of health habits?
5. What are the usual hours of the school day at each year of school life?
6. Through what years of school life does the pupil recite to only one teacher?
7. What does this teacher regard as her duties so far as the matter of health of the child is concerned?

8. During what years of school life is physiology taught?
9. During what years of school life is community health or sanitation taught?
10. What are the most important health problems to the solution of which health education can contribute? List in order of their importance.
11. What are the most important health practices or habits which the first six years of school seek to develop? List in order of their importance.
12. What procedures, methods, or devices are most valuable in improving health habits during the first ten years of school life?
13. Who is responsible for the supervision of health education? What has been the training of these people?

Physical education.

1. What are the objectives of the physical activity program during the first ten years of school life?
2. During what years of school life are brief two- to five-minute periods for stretching and relaxation provided during the school session?
3. How many minutes a day are allowed for physical activity during each of the first ten years of school life?

Hygienic Arrangement of the School Program.

1. How often are children resealed or seats adjusted to fit children? Who is responsible for this?
2. Is the classroom ventilation satisfactory? If not, what is the problem?
3. What is the usual length of the class period for each of the first ten years of school life?
4. How many weeks does the child go to school each year? How frequent and how long are vacation periods?

5. Through what years of school life is a mid-morning lunch available to the pupils at school? Of what does this lunch consist?

School Sanitation.

1. Are toilet, hand washing and drinking water facilities satisfactory? If not, what is the problem?

Communicable Disease Control.

1. What are the most common communicable diseases of school children? List them in the order of their importance as causes of death (mortality). Number them in order of frequency of occurrence (morbidity).
2. What is the governmental machinery for communicable disease control?

Physical Examination.

1. Are all school children given a thorough examination by a physician? If so, how many times during the first ten years of school life? How many children are examined per hour?
2. Are these physicians employed by the school or the health department?
3. Who assists in giving the examination?
4. Are the parents present?
5. Are the children stripped to the waist?
6. Does the teacher or nurse give any part of the examination alone? If so, what?
7. Is a dental examination given? By whom? How often?
8. To what children are psychiatric examinations given? What is the governmental machinery for this?

Follow-up.

1. By what means are parents encouraged to have physical defects corrected at their own expense?
2. Are school nurses employed? If so, by what branch of the government? What are their duties?

Clinics.

1. What types of clinics are open to school children?
2. How are these clinics supported?

3. What types of children (children of what financial status) are admitted?

The real contribution which this report makes is that it presents in a concise form present practices in health teaching by the countries represented at the conference.

Every physical education man and woman, school superintendent and principal who is interested in the promotion of a complete health and physical education program would do well to review this report. It is an excellent compilation of health teaching procedures which are easily accessible when needed.

Herman J. Norton
Director of Health Education
Rochester, New York

SAFETY EDUCATION. Idabelle Stevenson. A. S. Barnes and Company, Inc. 157 pp. \$1.00.

Miss Stevenson has made a worth while contribution to the "Extra Curricular Library" series edited by Dr. Harold D. Meyer. Safety education is relatively a newcomer in the public schools and like many of the newer subjects finds a desirable proving ground in the extra-curricular activity program. The book is particularly useful for teachers of health and physical education since in many school systems these teachers are partly responsible for safety activities. School patrols, assembly programs and safety in athletics are discussed fully and consideration given for the various causes of accidents not only for the secondary school but also for the elementary school age level. Safety is essentially an activity program and our students learn safety best when they are given activities to perform in a safe way. Miss Stevenson's book includes many of these activities that have been found worth while.

Based upon her broad experience and contacts as Secretary of the Education Division of the National Safety Council, and reflecting her intimate acquaintance with school safety work

all over the country, the book is as interesting as it is authoritative.

Herbert J. Stack,
Lecturer in Safety Education
Columbia University

CRIPPLED CHILDREN. Earl D. McBride, M.D., F.A.C.S. C. V. Mosley Co. 280p. \$3.50.

"Crippled Children," by Dr. E. D. McBride, is an interesting and well illustrated book, written for the use of those who are connected in any way with the treatment of orthopedic cases.

While it was written especially as an "instructor for nurses" in orthopedic work, it will be found very practical for authorities and attendants in all orthopedic institutions, such as those public schools which maintain more elaborate facilities for the treatment of orthopedic cases, and state and private institutions for the care and treatment of orthopedic cases. It may be of interest to Doctors, but is perhaps a bit too general, and not detailed enough to serve except as a description and possible outcome of cases, and an aid in diagnosis.

In the description of "technic for nurses in surgical orthopedics" it is very complete in details and should be of great value. The general treatment of the subject falls just short of too technical terminology, thus making it readable and interesting from a lay viewpoint. To every parent who has a crippled child, it holds out hope in the almost miraculous results possible from modern orthopedic surgery and treatment.

The subject is carefully organized; the various orthopedic conditions being described under the headings of causes, symptoms, treatment, outcomes, and nursing duties. Paralysis and tuberculosis conditions are given an extensive treatment, and the wide experience and knowledge of the author is shown in the comprehensive scope of the other orthopedic conditions covered.

The work is admirable, and a distinct contribution to orthopedic work.

W. Herbert Grigson,

Supervisor of Physical and Health Education

Philadelphia Public Schools

PSYCHOLOGY FOR NURSES. Fred A. Moss, M.D., Ph.D. Houghton Mifflin Co., 289p. \$2.50.

Although this book is designed as a textbook in psychology for nurses, it contains neither stimulating questions which would enable the nurse to apply the subject-matter discussed nor lists of collateral reading which might be used for reference. The absence of these is no doubt explained in the author's preface wherein he refers to the limited amount of time available for psychology in a training course for nurses. Dr. Moss has tried to meet the needs of the situation by frankly limiting himself to those aspects of psychology which might be of practical value and of greatest aid to the physician in treating patients.

The first part of the book is devoted to the place of psychology in nursing. The key-note is that all conduct is symptomatic and that the nurse should realize this and make observation and notes accordingly if she is to be the greatest help to the physician. Factors influencing behavior, the effect of bodily conditions upon behavior as well as the effect of drugs and such external factors as climate, season, weather, ventilation and the like upon one's reactions are taken into consideration. Emphasis is placed upon the importance of understanding the mind-body relationship in treating patients successfully. "It is quite as important to know what kind of patient the disease has as what kind of disease the patient has." The effect of the mental attitude of the patient upon subsequent recovery is covered under chapters entitled "Mental Disorders" and "Psychology and Delinquency."

The second part of the book is devoted to individual differences and their significance to the nurse and

physician. The key slogan is "Treat the patient not the disease." Much of the material in chapters entitled "Differences Due to Race" and "Differences Due to Family" seems rather irrelevant.

Inasmuch as nurses are called upon to serve in many and varied situations, a fairly high degree of psychological insight is needed. Since they deal with individuals who, at the time being, are not physically normal, it seems that the author could have devoted more space to the psychic effects accompanying certain bodily states together with some suggestions as to the ways and means of producing those psychic effects which would be most beneficial toward ameliorating functional organic difficulties. If mind and body are two aspects of the same thing, this seems imperative in the training of nurses.

In examining this text, we must remember that Dr. Moss who is Professor of Psychology at George Washington University as well as Professor of Neurology and Psychiatry in the Medical School has at his disposal plenty of case material for demonstration to his pupils. Furthermore, nurses are trained "in service." Instruction and training go hand in hand. The scope and nature of this volume can best be appreciated with this in mind.

Charles C. Cowell
Y.M.C.A. College
Springfield, Mass.

PHYSICAL DIAGNOSIS. Warren P. Elmer, B.S., M.D., and W. D. Rose, M.D. The C. V. Mosby Co. 903pp. 337 illustrations. \$10.00.

Although not a book for the average gymnasium or playground teacher, "Physical Diagnosis" does have many points of value to the supervisor or director of physical education whose broadening program calls for an increasing fund of knowledge and a greater familiarity with the technics concerning the physical examination and diagnosis. It is a physician's book, but its clarity of description and

its ease of reading, together with the many well-chosen illustrations widen its range of usefulness beyond the medical field to include anyone with a basic training in anatomy and physiology and whose work relates to health.

The sections dealing with the heart are particularly significant. Modern and well written, they constitute a valuable source of reference to the physical educator.

Medical directors in normal schools and colleges, where relations with the physical education and athletic departments are close, will find "Physical Diagnosis" a handy book for their office libraries. The content covers every phase of physical inspection and examination for all parts of the body.

Allen G. Ireland, M.D.

State Supervisor of Physical
Education, New Jersey

ANATOMY AND PHYSIOLOGY. Elizabeth Bundy, M.D. Revised and enlarged 6th edition by S. Dana Weeder, M.D. P. Blakiston's Son & Co. 446 p.

In this book we have an excellent text for nurses' training schools and for students of physical education and health. The book is apparently designed especially for nurses, although it meets the needs and requirements of the physical education and health teacher exceedingly well.

It is well arranged and set up, with the material clearly and concisely presented. The illustrations are excellent and numerous. The book combines anatomy and physiology, the structure and function of the human organism in a way that few texts in this field have succeeded in doing.

The application of bone and muscle relations to obstetrics and the possible anatomical and functional difficulties enhance its value to nurses.

Following each topical discussion appropriate clinical and surgical notes are included and these serve to vitalize the material and to relate it up to practical conditions in a way that increases greatly its value and interest

for the physical education teacher and nurse.

The brief summary and resumé at the conclusion of each topic also adds to its interest and value as a text. There is little space given to growth and development, and this would seem to be its one weakness from the standpoint of the physical education teacher.

The book is scientifically accurate and yet is presented in a way that makes it interesting and practical. The physical education and health teacher will find in this book an excellent text for use in this field.

John H. Nichols, M.D.

Oberlin College

LATERAL CURVATURE OF THE SPINE AND ROUND SHOULDERS. Robert W. Lovett. Fifth edition revised and edited by Frank R. Ober, M.D., and A. H. Brewster, M.D. P. Blakiston's Son & Co., Philadelphia, 238 pp. \$3.50.

Drs. Ober and Brewster have done admirably in revising Dr. Robert W. Lovett's work. The book is based on Dr. Lovett's experimental research on the spine with both the living model and the cadaver. This work which has never been refuted, is unique and is the foundation of recent advances in the study of the spine. Most of the original matter is contained in chapters III and IV. The Movements of the Spine and the Mechanism of Scoliosis, respectively.

An interesting conclusion from chapter X (Relation of Scoliosis to School Life) which seems in accord with modern thought is that there is apparently "no good evidence that moderate and severe structural scoliosis increase during school life or are directly caused by it." The greatest change and revision naturally occurs in the chapters on Etiology and on Treatment. Under this latter chapter the authors state that efficient gymnastics are the sole treatment in mild structural scoliosis as long as it results in progressive improvement. Warning, however, is given against

increasing the flexibility of the spine without providing for its support. Treatment in which gymnastics is combined with apparatus, corsets, stretching, and forcible correction is considered more effective. The treatment outlined is not practical for the physical education departments of schools and colleges as they could afford neither the apparatus nor the staff to work it, but technicians in hospitals, orthopedic surgeons, and physiotherapists should find its suggestions helpful.

The book is practical, concise, and well illustrated. It should be of great value to medical men especially to orthopedic surgeons, physiotherapists and to physical educators administering or teaching in the therapeutic phase of physical education. Major students in physical education will find it an interesting reference book. No one desiring a basic understanding of the movements of the human spine should fail to read it.

Harlan G. Metcalf
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Education, Ohio State Univ.
Columbus, Ohio

A HEALTH REVUE. Margaret Strassler. A. S. Barnes & Co. 75 pp. \$1.50.

"Clean, concise and opportune" describes the book, "A Health Revue" by Margaret Strassler. It is a "Pageant of Health Activities and Rules adapted for Junior High Schools."

Miss Strassler here presents to teachers an excellent vehicle on which to carry the "burden of our lay" in health education.

The book is complete to the last detail. It opens with an interesting introduction by T. M. Muir, Principal of the Junior High School in which the pageant was first presented. Then follows a synopsis, specifications for costumes, instructions and diagrams for staging, program "set-up" and descriptions of the drills and dances.

There are eight original dances, Spanish, Egyptian, Dutch, Grecian, Schottisch, Polka, Skaters and Milk Maids. A music reference and dia-

grams of formations for each dance make them easy to interpret. Four original drills—tennis, hockey, tumbling and free hand—are included.

The illustrations are excellent. The make-up of the book is attractive.

"A Health Revue" is the answer to many requests for suitable, practical and usable material for school pageants. It offers a splendid opportunity for launching a project of interest to all departments of the school.

By making it available in book form, Miss Strassler has rendered a distinct service to Health Education.

Mazie V. Scanlan,
Supervisor of Physical
Education, Atlantic City

PHYSICAL EDUCATION FOR THE PREPARATION OF GENERAL ELEMENTARY SCHOOL TEACHERS. By Emily D. Jameson, Ph.D. Bureau of Publications, Teachers College, Columbia University. 117 pp. \$1.50.

Since in the main, physical education in elementary schools is taught by the classroom teacher rather than by specially trained teachers of physical education, the training of these classroom teachers in physical education is a most important phase of teacher training.

This book by Dr. Jameson is a careful study of the content and requirements of courses in physical education offered in twenty-two State Teachers' and Normal Schools during the school year of 1926-27. Among the institutions investigated are some offering a two-year, a three-year, and a four-year course; also some which offer a major course in physical education, and some which do not. These institutions range in size from those with less than 200 students to those with more than 1000.

Topics included in Dr. Jameson's report are:

1. Organization of Courses in Physical Education. A report is made here of physical education time allotment and facilities in the various institutions included in the study.

2. Activities offered in physical education courses and their analysis as service and as professionalized subject matter. Carefully classified lists of all phases of physical education activities appear here.

3. Theory Content of Physical Education Courses. Findings are listed here according to types of institutions.

4. Observation, participation, and practice teaching. It is pointed out that only 417 of the schools investigated provided practice teaching of children's classes for all general elementary teachers in training.

Dr. Jameson brings out clearly the lack of uniformity in teacher training institutions, even in a small selected group. Time allotment, subject matter, and physical education facilities seem to be more uniform in schools of the same approximate size or type, while the more noticeable differences appear when the type and size of the schools in question are not the same. For example, quite generally in institutions of the medium size group there is much more in the way of an intramural program than in the larger or smaller schools. Also, in schools where there is no major department of physical education, the students receive much more opportunity for participation in physical education activities than in schools where there is a major department. Dr. Jameson makes the recommendation that since this is the case it might be well to leave the training of special teachers of physical education to universities.

In her final list of recommendations, Dr. Jameson includes the following:

1. Differentiation of subject matter according to needs of students.

2. Selection of activities which will provide for increased carry-over of activities into "out of school" time.

3. Stress of natural activities at expense of formal.

4. Greater coordination between physical education and other school subjects.

This study should prove to be of great interest to those in charge of teacher training both in the general education and the physical education field. While much has been done recently to broaden the curriculum in such institutions, there is still room for much improvement.

Ruth Evans,

Assistant Director of Physical Education, Springfield Public Schools, Springfield, Mass.

PERSONAL HYGIENE FOR COLLEGE STUDENTS. By Delbert Oberteuffer. Teachers College, Columbia University, New York City.

This is a most excellent piece of original work which makes a plea for the use of student interests in health teaching. It is a book for the use of teachers only and is designed to acquaint the latter with questions actually asked by students. These questions cover, in a practical way, every field in personal hygiene and seem to demand an erudition on the part of the instructor which, unfortunately, he does not and cannot possess. Many of them are familiar to the experienced teacher of hygiene, and some have even been asked of their parents by little children. Unfortunately there is no answer for some, for others to answer them as they might be asked would require many minutes, if not hours and days. The logical course of instruction may still be necessary as a time saver but certainly the teacher should find a question or two in Dr. Oberteuffer's list to justify the inclusion of any particular subject which he considers. This piece of research shows the greatest interest to be in mental hygiene. With reference to this subject of mental hygiene students are asking us for bread and we are giving them a stone.

Laurence B. Chenoweth, M.D.

Professor of Hygiene and Director of the Students' Health Service. University of Cincinnati, Cincinnati, Ohio.

THE MEASUREMENT OF MAN. By J. A. Harris, C. M. Jackson, D. G. Paterson, and R. E. Scammon. The University of Minnesota Press. 215 p. \$2.50.

Seldom are physical educators offered an opportunity to read a book at once so timely, interesting, and scholarly. The measurement of individual men is a first function of physical educators; they will be made more competent in and more fascinated with this field by a careful study of *The Measurement of Man*.

The book is in four parts, each prepared by a specialist in his field. All are or were members of the University of Minnesota faculty. J. Arthur Harris, late Head of the Department of Botany prepared the Chapter on "The Measurement of Man in the Mass"; Clarence M. Jackson, Head of the Department of Anatomy, that on "Normal and Abnormal Human Types"; Donald G. Paterson, Professor of Psychology, that on "Personality and Physique"; and Richard E. Scammon, Professor of Anatomy that on "The Measurement of the Body in Childhood."

The book is provided with over a hundred excellently planned plates, charts and diagrams, and contains information which should be the common inheritance of all physical educators. Comparisons are facilitated by several clever devices, especially those charts used to indicate the relative values of correlation coefficients. But the reader need not be a mathematician to grasp the significance of the statistical data included, so well are they presented.

From the scores of interesting and significant items reported in this volume, the following are taken at random. Husbands average five inches taller than their wives but the correlation between height of husbands and wives is quite low. Fathers and mothers are compared to children, the correlation coefficients apparently supporting the Mendelian laws. Interrelations between various body parts are reported in satisfying detail. Even

combinations of hair and eye color are given. Cephalic indexes are investigated and related to racial types, and their geographical origins are located. The relationships between height, weight and age are extensively investigated. Studies of personality and physique tend to destroy popular beliefs. We discover that there is almost absolutely no correlation between height of forehead or width between the eyes and intelligence. Long jaws and noses have no apparent relation to mental ability. Phrenology is once more dealt a death blow. Administrative executives in high positions, however, are usually an inch taller and twenty pounds heavier than similar officials in low places . . . "We may conclude that physical development and mental development are to a large extent independently variable." Several fascinating curves indicate the relative weights and rates of growth of various body parts. These indicate anew that the critical period of life is adolescence.

Frederick Rand Rogers

State Director of Physical Education,
Albany, New York.

THE PRE-SCHOOL CHILD AND HIS POSTURE. By Frank Howard Richardson, M.D., F.A.C.P. and Winifred Johnson Hearn, B.S. Published by G. P. Putnam's Sons, 1930. 220 pages. Price \$2.50.

The special claim of the child through the ages of two to five or six is urged by the authors since in infancy there is a strong interest in welfare and upon admission to school there is again a check-up, but between times there is apt to be serious neglect. This run-about stage is one of the periods of rapid growth, of high mortality and of great prevalence of preventable diseases. The authors are primarily interested in matters of posture, particularly as they are related to health.

The tissues involved in posture are the bones, ligaments and muscles, of which the muscles may be regarded as exercising active control. The cause of

faulty posture in general is stated as gravity pull, and due to the human erect position, there is an estimate of three hundred muscles participating in the maintenance of good erect position. The lack of vigorous use of large muscles necessarily interferes with their function, and indirectly often produces fatigue and other conditions favorable to faulty positions. The chief argument of the authors is that the real problem of posture is the proper development of the muscles involved, and that in order to do this the old plan of prescribed corrective exercise falls so far short of developing an interest on the part of the child that it becomes practically useless.

As a substitute for this there is proposed the employment of selected games, which because of their interest to the child of this age, will be entered into with enthusiasm and carried on with pleasure. A long list of such games is described and the relationship of the movements involved to the various postural deformities is explained. Naturally these games are largely mimetic and are representations of animals, birds or humans, or even of imaginary characters such as gnomes.

The authors make rather strong claims of the benefits derived from their system, such as that those desiring to use the idea will find no difficulty in devising games to combat any structural defect. The main postural difficulties considered are flat feet, tight posterior muscles, weak abdominal muscles, exaggerated lumbar curves and winged scapulae. To each of these a chapter is devoted and the games calculated to overcome the defect explained. The postural analysis is described in rather general terms without the use of specific standards. Perhaps this is well and yet when one is asked to check as to whether or not the spine has the optimum physiological curves, there is always the problem of judgment entering in. In the matter of standing there is no further definition of what is a good position, but

some suggestions are made such as "Could the pupil start running without shifting position?" It may fairly be questioned whether or not a position of this kind would be regarded as normal. Certainly the tendency would be to fall forward, giving an unstable balance and a tiring position. In connection with pronated feet, a series of footprints is advocated, partly for motivation and partly as a record of progress, yet the authors are careful to emphasize that the height of the arch is not in itself a sure index of strength.

There are a few definite measures suggested such as children with a sterno-pubic line more than one and one-half times the length of the sternum are potential victims of interoposis. The recording of the spine by the schematograph is apparently approved. Recent investigations have tended to throw less value on such tracings, since they do not actually represent the spine in the antero-posterior plane. There is no statement of fundamental physiological principles involved, such as the problem of the actual shortening of a muscle. This seems to be assumed, but just to what extent it may be done and what actually takes place in structural change is not even suggested.

The effect of the book might tend to make a novice over hopeful of securing results, but there appears to be no idea of any educational process whereby correct posture is defined. If the assumption that strong, well-developed muscles will in themselves assure good posture, then through the interest of the child as a means of motivation, the authors are certainly on the right track. But is the problem as simple as this assumes? One of the most complex and unsatisfactory departments of physical education is this matter of posture. Certainly the new point of view emphasized by this text deserves careful consideration.

G. B. Affleck,
Y.M.C.A. College, Springfield, Mass.

BOXING SIMPLIFIED. Prepared especially for teachers. By C. E. Kennedy. The Antioch Press. 75 pages. \$2.00.

This book by Dr. Kennedy contains the fundamental blows, counters and defenses in a very descriptive manner. It should render a valuable service to the boxing instructor who has limited ring experience. It is a valuable source of information as the movements and positions are analyzed and presented in a very readable manner.

I do not agree with the author in all technicalities, nor will every other reader, but this cannot distract from the value of the book which is a much needed guide in this field.

There are forty-two illustrations but the descriptions are far more explanatory. Boxing is hard to present by the "still-picture" method as positions are obtained by working into them and not merely "taken." This should be kept in mind when trying to analyze the illustrations.

To some instructors the commands may not be as short as would seem advisable for gymnasium classes, but they are explanatory.

The first part of the book deals with long distance fighting, describing the positions, defenses and counters in an effective manner. This is followed by short distance fighting. Here is given an analytical description of the movements of what is commonly known as "infighting." In dealing with effective drill combinations, to which the author has attributed the third part of his book, he has selected a very good group of "set-ups" to teach mechanical response so that the body will act reflexly in competition or under actual fighting conditions.

The fourth part deals with training hints. These should be firmly fixed in the minds of all participants at the beginning of the course. It is clearly indicated that the boxer, in order to successfully master the art of self-defense, must follow a rigid set of training rules.

On the whole, the book will be of great value to all interested in physi-

cal development because of the opportunities afforded by this form of exercise and recreation.

L. M. Philbin,
Instructor of Boxing,
University of Michigan, Ann Arbor.

HEALTH, PUBLIC AND PERSONAL. By Ralph E. Blount, published by Allyn and Bacon, 1930. 347 pp. \$1.20.

Since the new education has included health as a part of its curriculum, there is naturally a demand for suitable textbooks for the use of both pupils and teachers. Many of these are prepared by physicians, some of whom lack pedagogical training and experience essential for a presentation which will provide the needed motivation. The author has the advantage of long practice in teaching and has tested his methods, so that in the present revised edition the manner of presentation as well as facts selected are most commendable.

In the elementary grades the approach to health education consists in forming habits and developing attitudes towards healthful living, but as the pupils mature, they are ready by junior high school age for information which will supply the reason for hygienic living. So after the first two chapters, the author gives not only well selected information on each topic but also shows its hygienic implications.

One of the sound procedures used by the author is the definition or explanation of technical terms the first time when used, followed soon by their appearance in the context. Possibly it might have helped, particularly for pupils of the junior high school age, had the same practice been extended to non-technical terms; or perhaps better had the language been simplified. This could have been done without loss of force or meaning. A few examples from the earlier pages of the text follow: "aggregation" page 10; "assimilate" and "inanimate" page 11; "alternation of processes" page 12.

The device of using review questions at the end of each topic seems sound. The illustrations are generally good although if the magnification of certain of them had been extended, there would have been given a fairer idea of the actual size of that which was represented. There is perhaps a trace of the rather outgrown moralizing or preaching, especially in connection with stimulants and narcotics. But the material is in the main well selected and presented, constituting one of the best texts which has come under the reviewer's notice for work in this particular field.

G. B. Affleck,

Y.M.C.A. College, Springfield, Mass.

HANDBOOK OF ANATOMY. By James K. Young, M.D., F.A.C.S., revised by G. W. Miller, M.D., F.A.C.S. Seventh revised edition. F. A. Davis Company, Philadelphia, Pa. 460 pp. \$3.75.

Here is a book which rightly deserves the title of "handbook." Whereas some handbooks are either bulky or look too much like a catalog of different names, this one has none of these defects.

The aim of the authors was to lighten the labor of the medical student, and they surely succeeded in it. The material is arranged in a clear and logical way. Descriptions are brief but comprehensive. A number of diagrams and tables facilitate the task of understanding and, what is a great deal harder, of memorizing the relation between various parts of the vascular, nervous and other systems.

The index at the end of the book not only shows where to find a particular subject but also where to find an illustration of it. It seems to be particularly suitable for a book on anatomy.

It is also commendable that Dr. Miller decided to use the B. N. A. terminology in preference to the old one.

P. V. Karpovich, M.D.

Y.M.C.A. College, Springfield, Mass.

PHYSICAL TRAINING, GAMES AND ATHLETICS IN SCHOOLS. A TEXT BOOK FOR TRAINING COLLEGE STUDENTS. By M. B. Davies. George Allen and Unwin Ltd. 296 pp. 6 shillings.

This text is the third edition, revised and enlarged, giving a valuable viewpoint of the physical education set-up for elementary school teachers and gymnastic teachers in secondary schools.

In the words of the author, who is a Lecturer in Physical Education at the North Wales Training College, Bangor, the aim "of school physical education is first to develop the average normal child physically and mentally so as to give that poise that a well-working, satisfactorily shaped, agile body can afford, that poise, too, that is gained in the first twenty years of life and, once gained, is not readily lost. A second aim is to give the child a real appreciation of exercise and fresh air that he will take with him into adult life, and a third to furnish him with a lively regard for group as opposed to merely personal interests. A fourth aim, of a preventative order, is that of supplying the growing child with a power resistance to minor ailments, which tend to make the average individual accept, all too readily, a low rather than a plus standard of general health as all he can manage."

The achievement of these aims is put squarely in the hands of the teacher.

In the first nine chapters the author outlines the effects of physical education, and explains the use and content of the "table" or, lesson plan, which is a modified Swedish form, simplified and adapted for outdoor conditions, short periods, and on the whole for younger children.

The remaining fifteen chapters deal with special conditions, play theories, competition, playgrounds and apparatus, the organization of games, umpiring and coaching, planning game periods for infants, juniors and seniors, sports and athletics, the organization of sports days, tabloid or potted

sports, standard tests, dancing, swimming, and a closing chapter on the criticism of lessons presented by teachers.

Throughout the book there are explanatory single line figure drawings and also diagrams for conducting activities.

There is a four page list of reference books, a few of which have American authors, and a four page double column index.

The book would seem to be of value in this country in our teacher training institutions for general information on comparative programs and teaching techniques.

A. S. Hotchkiss, Superintendent, Division of Physical Education and Athletics, Tennessee Coal, Iron and Railroad Company, Birmingham, Ala.

EURHYTHMICS, ART AND EDUCATION.

By E. Jaques-Dalcroze. Translated from the French by Frederick Rothwell. A. S. Barnes & Co. 261 pp. \$4.00.

This is the first rather complete account of the contribution of E. Jaques-Dalcroze to the study and significance of rhythm to be written in the English language. There have been others, but they were only sporadic references and translations.

The book appears at a time when the art of dancing is seeking and reaching new heights. It is interesting to note that practically all the exponents of the newer art of dancing, from Isadora Duncan to Mary Wigman, and including Bode, Laban, Loges and others, trace their concept and inspiration to, and base their art upon Dalcroze's idea of interpretation.

In 1905, this reviewer wrote of Dalcroze and his work in *Mind and Body*, and soon after that, at a national convention of the A.P.E.A. in Boston, put on a demonstration of some of the fundamental Dalcroze exercises.

To the student of the dance, as well as to the searching teacher in the field of physical education, this book will be most fascinating. The book not only

suggests the underlying philosophy and theory of rhythm, but by its effective illustrations contributes the practical applications.

"Eurhythmics, Art and Education" is a splendid translation, which the publishers have presented in a most fitting setting. One is at once impressed with the thoroughness and sincerity of the author. Chapters such as, "The Technique of Moving Plastic," "The Inner Technique of Rhythm," "Style and the New Spirit," and "Balance," are particularly fascinating.

We need to incorporate more of the esthetic into our all too angular and heavy type of work for our girls, and this book may well be an aid in that direction.

Carl L. Schrader,
State Supervisor of Physical
Education, Massachusetts.

THE NEGRO IN MODERN INDUSTRIAL SOCIETY. By Dean Dutcher, Ph. D. The Science Press. 137 pp.

An analysis of Changes in the Occupations of Negro Workers, 1910-20, by Dean Dutcher. xv-137 pp. (The Science Press Printing Company, Lancaster, Penn. 1930.)

Doctor Dutcher, Professor of Social Science in State Teachers' College, Millersville, Pennsylvania, presents a brief, scientific and thought provoking study showing the trends in Negro population since emancipation.

He describes the exodus out of the old South with its dominating agricultural economic and the redistribution into all parts of the United States, with the Negro's adjustment to industry. He compares the occupational statistics of the Federal Censuses of 1910 and 1920, which are usable in determining present trends of employment of negro workers.

The first three chapters present the historical economic background of this group of workers, outlining the forces that have been instrumental in creating the economic life of the Negro in the United States.

In Chapter IV the possibilities of the Negroes as a source of labor are discussed and the surprising trend is indicated that the group will be of decreasing numerical importance to the industries of the nation.

Chapter V discusses the significance of the Negro not gainfully employed from the social point of view. He analyzes the influence of school attendance, of female workers, is thoroughly aware of the difficulties of comparing data and arrives at the conclusion that greater economic freedom is doubtless a definite cultural advance.

In Chapter VI the trends of the gainfully occupied Negroes are studied and in Chapters VII and VIII the changes of the Negro in specific occupations and in typical cities are indicated. Chapter IX shows the probable social and economic implications of these changes.

The two closing chapters deal with the interpretations and conclusions that may logically be drawn from the comparable data. Twenty-four tables and two charts supplement the manuscript.

The study will be of greatest value to persons interested in the trends of Negro life in the United States and indicates the need for further study when the figures of the 1930 census become available.

A. S. Hotchkiss, Superintendent, Division Physical Education and Athletics, Tennessee Coal, Iron and Railway Company, Birmingham, Alabama.

HOW MEN HAVE LIVED. By Charles V. P. Young. The Stratford Company. 313 pp. \$2.50.

The author, who is Professor of Physical Education at Cornell University, has given us a very readable, graphic, delightful, interesting and instructive book, that is teeming with ancient and current historical facts and opinions which should be the common possession of every educator.

In a rapidly moving, pertinent style he hits the high spots not only in the history and development of physical education but also the manners and

customs of living, practices, beliefs and disbeliefs of humanity through the times of ancient Egypt, Palestine, Persia, Greece, Rome, the early Germans, medieval Europe, in the days of Knighthood, sixteenth century England and a final chapter on present day tendencies in the United States.

Moreover, the author has attempted to more or less evaluate these ways of living, and in the main has done well in pointing out their shortcomings as well as their merits. He finally freely criticizes present day tendencies of "degeneration" and winds up with his philosophy and opinions of how the world might be made a better place in which to live. To bolster up his contentions he draws many apt parallels to similar occurrences throughout human history.

It is not the reviewer's intention to detract from the important contribution which Mr. Young has made. However, were it not for certain remarks in his preface and final chapter the body of the book might pass muster even though it did contain such inaccuracies as "insanity" (a word which should be purged from lay language in favor of "mentally sick") being a relatively new disease.

Critical common sense regarding social evolution and scientific progress leads us not to share the pessimistic, non-melioristic, somewhat restricted perspective and opinions of the writer. For example he states in his preface that "the actual span of life of the individual man has not been lengthened one iota, also that his mental capacity has not appreciably increased since he first emerged from a state of barbarism." Such a statement is not only contradicted by facts in his own book but also by information in a recent article written by the president of the university of which he is a faculty member. Here it is stated that the average age at death has been extended from 47 years of age in 1900 to 57 years in 1930. One has only to reflect (an all too rare psychological functioning) on the tremendous advances in medical and oth-

er sciences, sociology, humanism, economics, and the opportunities for enriched living today that were unknown even a century ago.

Mr. Young's criticism of false objectives in American sports on the whole are well deserved. But it might be well to remember that because the objectives that have been allowed to trickle in or engulf many athletics of schools and colleges such as playing for the chief purpose of winning prize cups, etc., should not necessarily invalidate or discourage the games or sports themselves. Is it not rather a challenge to re-educate the physical educators, student-body, faculty and general public to more wholesome, healthful and socializing objectives? Is it wise to scrap time-proven, healthful, socially approved games or sports and throw common sense to the wind just because some educators do not possess the insight, foresight and real critical common sense nor feel themselves capable to undertake the obligation of helping to re-shape the ideals and objectives in sports education and so-called "physical education" in general? Will not continuance in such an attitude tend to add fuel to the already undesirable cliché? The problems demand the *active* cooperation of educators in general but also the putting across of better objective aims and values to the student body and general public. This is not only a man-size—but perhaps also a life-size job. Would this not be sounder and have a more long term effectiveness than a five year inter-collegiate moratorium as proposed by the author?

In the main the author has given us a praiseworthy book. The reviewer wishes it every success for a wide and critical reading.

Frederick L. Patry, M.D.

Neurophysiologist, State Education Department, Albany, New York.

CHARACTERISTIC RHYTHMS FOR CHILDREN. Anna M. R. Schmidt and Dudley Ashton. A. S. Barnes & Co. 45p. \$80.

The interesting approach made in "Characteristic Rhythms for Chil-

dren" by Miss Anna Schmidt and Miss Dudley Ashton is that the rhythms are not those invented by grown-ups for children, but rather those suggested by the children themselves and merely put into usable form by adults. Also the method of procedure is unusual, namely, starting with an idea, expressing that by movement, and then writing appropriate music for this dramatized movement.

As in some other books of this type, the big muscle activities are stressed and every chance is given to develop the dramatic instinct of the child. Each rhythm is built around ideas which are closely correlated with what the children are studying in the kindergarten and primary grades, or with their main interests outside of school. The animal motions are taken from observations of their pets at home or in school, or what they see at the circus, or on the street when the organ-grinder goes by. Also common sights of special interest to children are included in the rhythms, such as fire engines and airplanes.

The music at the end of the book with the strains reminiscent of the different countries gives an excellent chance for full initiative in working out National rhythms to new music.

This book should prove to be a great help to all working with youngsters. The children themselves will undoubtedly establish its popularity and prove its worth.

Grace B. Daviess

Ass't Professor of Physical Education,
University of Cincinnati

SOME BITING REMARKS. Happy Goldsmith. A. S. Barnes & Co. 43pp. \$.75.

The detailed title of this clever little book in Happy's inimitable style reads, "Some Biting Remarks, for those who are constantly hungry, prepared and served by Happy Goldsmith."

The book serves up a number of health facts in the form of questions which growing boys and girls ask of

Happy. They demand an explanation of facts which to them are highly questionable. He goes back to his own school life and from his experience answers the questions in an understanding though facetious manner. For example, Tubby asks, "Should those of us who have double chins drink milk?" Alice says, "Dear Happy, I don't like the taste of either spinach or milk. What is more they do not agree with me."

The book is filled with illustrations drawn by the author and are reminiscent of the well beloved "Happy Calendars." "Biting Remarks" stands out in red ink on the margins of the book and give it a rather enticing touch. It is the sort of book you might leave around for someone to pick up in an idle moment, glance through, chuckle over a bit here and there and finally read through because they must find out why the author answered so many questions.

Marguerite Behrensmeyer
Community School,
Saint Louis, Mo.

DETERMINATION OF THE INTERRELATIONS, PARTIAL AND MULTIPLE, BETWEEN VARIOUS ANTHROPOMETRIC MEASUREMENTS OF COLLEGE WOMEN. Mary Louise Boillin. Bureau of Publications, Teachers' College, Columbia University. 63pp. \$1.50.

The chief point made in this work is that the height-weight-age tables so commonly used as a criterion of under- and over-weightness in young women are inadequate and misleading. The data used for investigation consist of a series of five skeletal measurements (height, chest depth, chest width, shoulder width and hip width) and body weight, taken on 815 students of Wellesley College with an average age of 18½ years.

By the use of correlations of the zero order, and by partial and multiple correlations, involving weight and the five skeletal measurements, it is shown that:

(a) Height is the poorest single dimension, out of those given, for esti-

imating weight, while chest depth is the best.

(b) The more of these skeletal measurements that are used in combination as a basis for estimating weight, the more accurately may the weight be predicted.

(c) The multiple correlation of the five skeletal measurements with weight (.83) leaves considerable variability in weight still unaccounted for, which may have a bearing on the state of health. By comparison with similar data on children of 11-12 years of age, it is brought out that at the younger age it is possible to predict weight much more accurately from the skeletal dimensions than it is at the college age.

The author submits equations by the use of which one may predict the normal or expected weight from the five skeletal dimensions in women of age and physique comparable to the Wellesley students; also, equations by which one may calculate the norm for any one skeletal dimension, having given the other four.

About eight of the sixty-three pages are taken up with a justification of the data used, particularly with the elimination of some of the original data. It seems as if this material might as well have been treated more concisely.

There is an appendix giving the basic data in tabular form, and a bibliography of 21 titles. No index.

Dr. Harley N. Gould
Department of Biology
Tulane University

SONGS FOR THE SCHOOL YEAR. George S. Dare. A. S. Barnes and Company. 174pp. \$1.20.

This is a pleasing collection of songs that all children should know. The songs have been chosen with thoughtful care from the best of composers and authors. They are so simplified that school children may read and sing them, and yet have the melodies live in their minds along with the names of the great men who wrote them. The print is clear and

the arrangement easily followed by a musician of average ability.

"Songs for the School Year" contain songs from all nations and all times, folk songs, national anthems, ballads, songs of chivalry and romance, beloved church hymns, songs of the sea, songs of the seasons, student songs, Christmas songs, in fact songs for every occasion are included. They cover a wide range of emotions and illustrate a great variety of subjects.

The classified index is so arranged that with a moment's search, the song best adapted for the particular need along with the page number where it will be found, makes it a valuable aid to both teacher and pupil.

"The calendar for the school year" will also prove to be of great assistance in arranging programs for various school festivities. It will also be a great help in pageant work and playlets, in exhibitions and for any event in which songs of all nations might be used.

There is a close relationship between music and physical education. Teachers of physical education should use music and singing in the gymnasium losing no opportunity to teach their classes the name of the composer of the music that is being used in the work they are doing, especially in dance activities. In folk dancing songs may be taught to accompany the dance, thus fixing in the mind of the child that particular country from which the dance was taken. While we cannot say with Plato that God gave men music and gymnastics for mental culture alone, we can translate his words into modern terms and say that the highest aim of music and physical education is to preserve and train the wholesome integrated personality.

There is no doubt that "Songs for the School Year" will be a welcome addition to either private or school library.

W. K. Streit

Director of Physical Education
Cincinnati, Ohio

CHILD HEALTH. Mrs. Norma Selbert, R.N., B.S., A.M. W. B. Saunders Co. 261 pp.

Mrs. Norma Selbert has prepared in her small book, "Child Health," a very capable presentation of material pertinent to the welfare of the child. One notes particularly throughout the volume that she has not made a compilation of trite material which one is so apt to find in a book on this subject. The material has been gathered with especial reference to that which has been founded on a scientific basis. In so doing, she has made available today's advanced knowledge of the child.

The contents of Mrs. Selbert's book are the outgrowth of her successful work in teaching the subject to classes in Child Care and Adult Education. She gives background in a preliminary discussion of "The Evolution of Child Health Work" and impresses the necessity for scientific training and an understanding of the situations in which the child must live together with a knowledge of the problems affecting the growth of children. The child's life and problems are discussed in accordance with the recognized periods and with an understanding of emotional life. Important material for the university student and the mother and father has been included.

The most commendable features of this book are as follows: the inclusion of only chosen material; illustrations that illuminate the subject matter and stress basic principles; a scientific and yet non-technical manner; and a sane point of view.

This book, which is in pocket handbook size for convenience, should appeal to all who need and want material on "Child Health" and want it founded on a scientific basis, but given in a practical, clear and non-technical manner.

Lurene M. Prouse

Michigan State Normal College,
Ypsilanti, Mich.

NUTRITION AND FOOD CHEMISTRY. By Barnard S. Bronson. John Wiley & Sons Inc. 467 pp. \$3.75.

Apparently this text is devised in an effort to separate the "grain from the chaff in presenting the elements of nutrition and food to a group of college students with little foundation in physiology and none in organic chemistry." The author assumes its users will have "only knowledge of elementary chemical principles."

The chapters, after a brief preliminary introduction "On the Organism and Its Environment" might well be grouped into four major divisions: 1—Digestion; 2—Foods; 3—Body requirements; 4—Special foods.

The text is loaded with large amounts of very valuable information for the person who is technically prepared to read it understandingly, and is in such a teaching position as to be able to use the information profitably. If it is intended for the use of special teachers engaged in training nutrition workers, or in a course on the chemistry of nutrition, it doubtless has great value.

If it is designed, however, for the instruction of those who will become regular class room teachers, and as such may be required to teach nutri-

tion as a part of the regular elementary or secondary school program in health education, it would seem technical beyond reason.

Chapters four to eight inclusive—some eighty pages—devoted to the composition of food stuffs, are so technical that the ordinary class room teacher would be wholly submerged and thoroughly discouraged, and most of those taking nutritional or physiological chemistry would find the material hard to assimilate.

The later chapters have a much greater practical value. They discuss the food requirements of the body as regards protein, energy, inorganic salts and acid-base balance, and vitamins; as well as the composition, values, digestibility and dangers of the various food groups such as milk and milk products; butter, oleomargarin, cheese, and ice cream; eggs and meat; vegetable foods; legumes, root crops, and green vegetables; and fruits.

This is a valuable text for the specialist in the field of nutritional chemistry, but too technical for the majority of students in a teachers' college. It would have little practical value for them.

Charles H. Keene, M.D.
Professor of Hygiene,
University of Buffalo.

BOOKS AND REPRINTS

of the American Physical Education Association

Address Box 362, Ann Arbor, Mich.

The recently published study "Physical Education Curriculum in Professional Schools" by the Committee on the Curriculum of the 139 institutions preparing teachers of Physical Education in the United States is available at the regular prices, i.e., \$3.00 per copy.

The "Review," back copies to 1898: Single copies, 30c; 4 copies, \$1.00; 10 or more, per copy, 20c. One volume, bound, \$4.00 (Postage prepaid).

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